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ELECTRICAL WORLD

A consolidation of Electrical World, Electrical Engineer and American Electrician

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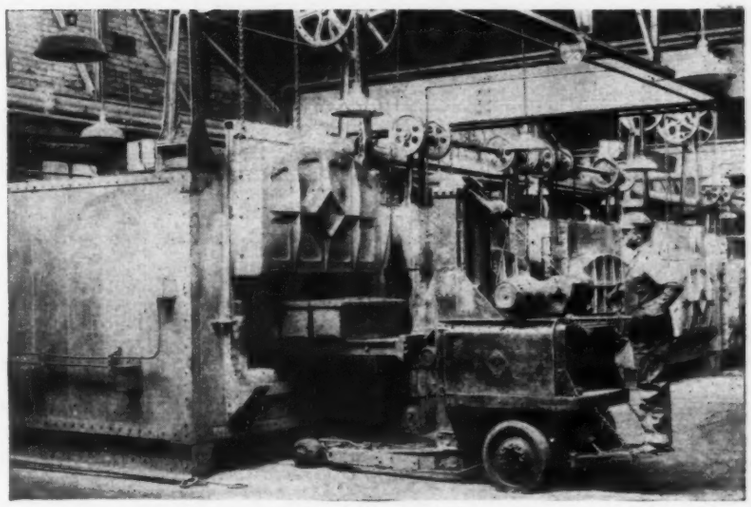

AUGUST 2, 1930

Contents Copyrighted, 1930, by McGraw-Hill Publishing Company, Inc.

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CABLE ADDRESS: "MACHINIST, N. Y."

Published weekly. $5 per year. 25 cents per copy. Entered as second-class matter, January 20, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Member A.B.C.
Member A.B.P.

NUMBER OF COPIES PRINTED THIS ISSUE, 18,270

NEW YORK District Office, 285 Madison Avenue
WASHINGTON, National Press Building
CHICAGO, 520 N. Michigan Avenue
PHILADELPHIA, 1600 Arch Street
CLEVELAND, 501 Guardian Building
ST. LOUIS, 1556 Bell Telephone Building
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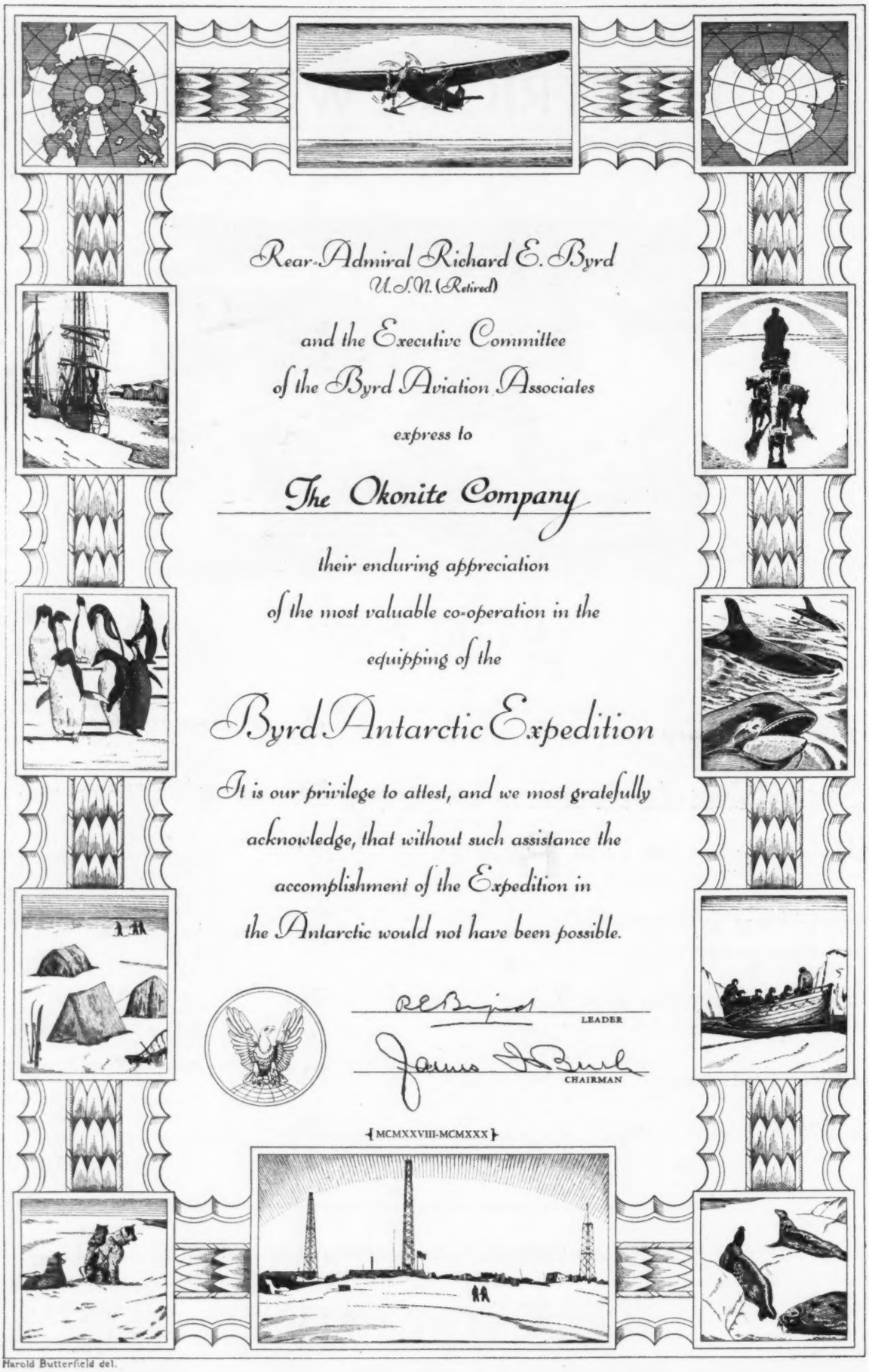

Harold Butterfield del.

ELECTRICAL WORLD

for the Week Ending

August 2, 1930

Oregon rates cut on load, not use, basis

Low water adds million to May fuel bills

Hoover stirs Muscle Shoals politics

Utility financing up 38 per cent

—OREGON commission orders lower rates for Portland after two-year valuation. Small users favored by cut in top rate and placing of all with same-sized load on equal basis regardless of hours of use.

—HOOVER criticised by Muscle Shoals advocates of governmental operation for backing Reece opposition to Norris bill. Norris charges bad faith and "power trust" bias on part of the President.

—ELECTRICAL ENERGY for light and power is not used solely because it is cheapest, points out heating expert, so why not take the dollar mark off the electric heat question?

—CAPITAL issues by electric power and light companies for this year to date total $876,000,000, an increase of 38.4 per cent over comparable period last year.

—RURAL customers of Public Service Company of Northern Illinois up 43.6 per cent in past year; energy sales for May rose 70.8 per cent. Model farm gets credit from officials for sales-revenue growth.

—PRICE CUTTING, purchasing reciprocity and bargaining; electrical manufacturers discuss the pros and cons and show the matter to be less simple than might be hoped.

—NIAGARA-HUDSON finds reforestation to be one of its functions. To date more than 21,000,000 trees have been planted by component companies and 5,000,000 will be set out this year.

—SALESMAN'S compensation; an old problem, but Public Service Company of Colorado has found a satisfactory plan promoting both company and individual interests. "Sell the salesman his job" is the idea.

NEWS OF THE WEEK

Presidential Letter on Muscle Shoals Attracts Criticism

CONSIDERABLE criticism was this week directed against President Hoover by advocates of governmental operation of the Muscle Shoals hydro-electric development because of the publication of a letter written by him to Representative B. Carroll Reece of the First Tennessee District in which he indorses that congressman's opposition to the Norris Muscle Shoals bill, which failed to pass in the last hours of Congress largely owing to Mr. Reece's stand. Senator Norris' bill was intended to bring about government operation, and some of its advocates asserted that the President was on record as favoring a solution of the Muscle Shoals problem along the lines followed in the proposed Norris measure.

In his letter to Representative Reece Mr. Hoover said:

> I hear that your opponents are charging you with failure to serve the interests of your constituents because you refused to accept the Senate plan for dealing with Muscle Shoals. The fact is that the House plan will secure development of this great resource more effectively and more greatly in the interest of Tennessee than would the Senate plan. I am assured that the Senate plan cannot be passed in the House. Nor would I approve the plan, because it is not in the interest of Tennessee or the rest of the nation. Your course has been the only one which can secure an advancement of this development in the interest of the people of Tennessee.

"His communication," declared Senator Norris, "places the President on the side of the power trust in power development. It seems to be a violation of the pledge that many of the leaders in Tennessee took in good faith during the presidential campaign, when they supported Mr. Hoover on their reliance on his statement in his Elizabethton speech and an interview he gave following that speech."

At Elizabethton, Tenn., in the course of the presidential campaign of 1928, Mr. Hoover said: "There are local instances where the government must enter the business field as the by-product to some great major purpose such as improvement in navigation, flood control, irrigation, scientific research or national defense." He is said to have informed a local newspaper that he had Muscle Shoals in mind.

Senator McKellar of Tennessee also criticised the President's letter to Congressman Reece, saying that Mr. Hoover had "come out four-square for the power interests." Mr. Reece's opponent in the Tennessee Republican primaries, which will be held on August 7, is Samuel W. Price.

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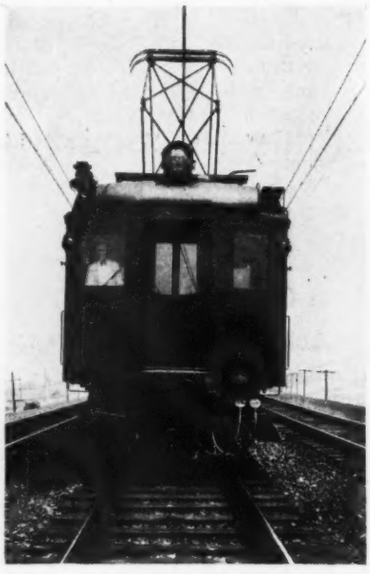
THE MODERN WAY



This excellent end view of a four-unit, eight-car electrified Lackawanna train was taken during the trial demonstration reported last week (page 148). A view of the two-car unit was printed on June 14 (page 1188).

▼

Wilson Dam Operating Up to Its Capacity

FULL output of power from Wilson Dam at Muscle Shoals is now being distributed by power companies in Georgia, Alabama, Tennessee and Mississippi. Owing to the severe drought having cut down power from other sources, the Alabama Power Company has made demands in excess of what could be supplied by the government-operated plant at Muscle Shoals. Peaks in the taking of power from Wilson Dam occurred on May 7, when 3,004,000 kw.-hr. was produced and the demand ran up to 140,000 kw., and on June 17, when 3,288,000 kw.-hr. and a demand of 140,000 kw. were registered.

Southern utility systems are drawing down their storage basins to supply the power needs of their customers. Martin Dam, on the Tallapoosa River, in Alabama, is producing an average of 1,000,000 kw.-hr. daily. With the normal dry period ahead, power officials say, reserve steam plants may be started up in Alabama early in August unless sufficient rain falls in the meantime.

▼

Stream-Flow Loss Grave, Says Geological Survey

DEPLETION of hydro-electric power during the current drought is costing the power industry millions of dollars in auxiliary fuel consumption according to estimates prepared from United States Geological Survey data. In May of this year the deficiency of hydro output was roughly 250,000,000 kw.-hr. Fuel costs to supply this shortage totaled nearly $1,000,000. Though statistics for June and July are not yet available, it is obvious that the condition was worse than in May. Relief is not yet in sight. Long-continued deficiency in rainfall is responsible for the trouble rather than the record-breaking spells of hot weather. Stream flow depends on ground storage during the summer months, which is becoming prematurely depleted. Evaporation is a fairly constant and minor

factor as compared with rainfall. The present condition is serious in that areas east of the Rocky Mountains are reaching low-water conditions unusually early in the year and that some streams are already approaching record low water. Minimum flow for an average year in the East does not come till sometime between September and November. Thus, even if rainfall during the remainder of the summer picks up to average, which seems unlikely, some streams may be expected to continue falling and to reach a minimum for all time before the end of the year. Western streams depending on snow water are not so badly off.

The trend toward sub-normal hydro production started back in May, 1929. The area about Washington, D. C., has been hardest hit as the drought was first felt there and gradually extended throughout the nation east of the Rockies with New England and the South Atlantic seaboard suffering less than most other regions. The Potomac River probably is one of the extreme examples. At present its flow is about 1,000 sec.-ft., the minimum record being 700 sec.-ft. Water resources engineers of the Geological Survey would not be surprised to see a new low-water figure established before fall.

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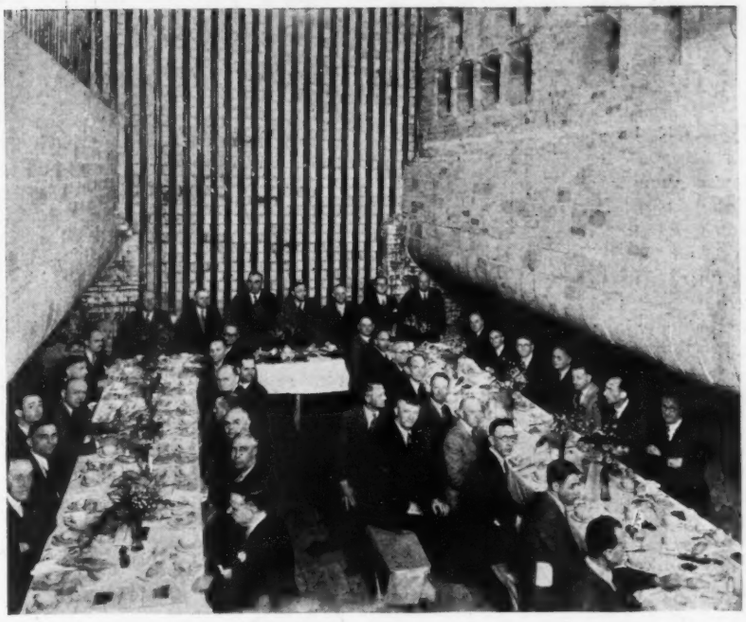
DINING INSIDE NEW HOG-FUEL BOILER



Celebrating the completion at Portland, Ore., of the largest boiler in the Northwest, the Pacific Northwest Public Service Company held a banquet inside the boiler at which the Mayor and city commissioners were present. Vice-President O. B. Coldwell presided. This B.& W. 2,650-hp. boiler was installed in station "L" to serve a 35,000-kw. generator now in process of erection. It will burn either hog fuel, or oil and operate at 450 lb. and 700 deg. F.

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S.E.D. Prepares Twofold Lighting Campaign

TWO new and comprehensive local lighting programs designed to increase factory and store lighting sales respectively have been announced to the electrical industry by the Society for Electrical Development. These programs, co-ordinating promotion and sales, have been developed at the request of the manufacturers of lamps and lighting equipment who have asked the society, through its commercial and industrial lighting committee, to prepare a form of local campaign that will assist local lighting groups to capitalize on their sales opportunities.

▼

No Preliminary Injunction in Standard G. & E. Suit

OBSERVING that he had not had time to study the voluminous affidavits on which four minority stockholders in the Standard Gas & Electric Company based a petition for a preliminary injunction which would operate to set aside that organization's purchase of the Philadelphia Company, Chancellor Walcott at Wilmington, Del., refused on Tuesday of this week to entertain the application. The reorganization by which the Standard Gas & Electric Company purchased the assets of the Standard Power & Light Corporation, of which the Philadelphia Company was formerly a subsidiary, was sanctioned by Standard Gas & Electric stockholders last January, President O'Brien asserting that only 1 per cent of voting shares were cast against it.

▼

To Cancel Entries for Tennessee Tributaries

SIX applicants for power rights in the Tennessee Valley have been called upon by the Federal Power Commission to show cause why their applications should not be canceled. They are the Hiwasset Power Company, Hiawasset River; Tennessee Eastern Electric Company, Nolichucky River; Robert B. Gordon, Cumberland River; Nolichucky Power Company, Nolichucky - Toe River; Union Carbide Company, Clinch and Power Rivers, and Tennessee Hydro-Electric Company, Clinch and Power Rivers. In these cases applications for preliminary permit were filed in 1926, with the exception of the Tennessee Hydro-Electric Company which filed its application in 1922 for several sites on the Clinch and Power Rivers.

This is an effort on the part of the commission to clear its records of cases where further action seems to be precluded. In 1927 the commission assured the state authorities in Tennessee that it would take no action on water-power applications until the state commission had an opportunity to pass on them. As several years have passed during which the applicants have been unable to obtain state rights, the commission will cancel these applications August 21, unless it can be shown that there is a prospect for obtaining state approval.

The commission now expects to take up all pending applications on the St. Lawrence and rid its records of any applications on which action is unlikely. A similar course was pursued recently on the Potomac and Colorado Rivers.

Sites on the Salt River do not interfere with the scheme of development on the Colorado River. Four pending applications on that stream probably will be granted in the near future if the applicants will give the commission assurances that they are willing to proceed promptly with the development. Three of these applications were filed by James B. Girand and one by J. L. Fish.

Scandinavian Cities Welcome I.E.C. Delegates at Plenary Meeting

THREE hundred delegates, representing 22 countries, attended the seventh plenary meeting of the International Electrotechnical Commission, which assembled this year at Copenhagen, Denmark, on June 27, holding subsequent meetings at Stockholm, Sweden, and Oslo, Norway, with its principal sessions in Stockholm. The meeting adjourned on July 9, after recommendations had been submitted to the council by the nineteen committees to which is intrusted the formulation of an international consensus of opinion on ratings and nomenclature. The most important of the recommendations this year were probably those of the committee on rating of electrical machinery, which dealt with the limits of temperature rise. These will be summarized in a later issue of the ELECTRICAL WORLD.

Paul Larsen, chairman of the Danish Institute of Civil Engineers, addressed the delegates at Copenhagen, emphasizing the desirability of the engineer speaking a technical language known and used all over the world. Luncheons and banquets were tendered the delegates at the cities visited, and their trips included many points of both industrial and scenic interest. Special tribute was paid to the honorary president, Colonel R. E. Crompton of London, the founder of the body.

Dr. A. F. Enström, president of the Swedish national committee of the I. E. C., was elected president of the international body in succession to Prof. Clarence Feldmann of Holland.

The countries sending delegates to the meeting were Austria, Belgium, Brazil, Canada, Czechoslovakia, Denmark, France, Germany, Great Britain, Greece, Holland, India, Italy, Japan, Norway, Poland, Roumania, Russia, Spain, Sweden, Switzerland and the United States. American delegates included Dr. Clayton H. Sharp, president of the American committee; Dr. C. O. Mailloux, honorary president I. E. C.; Prof. A. E. Kennelly, honorary secretary; James Burke, H. S. Osborne, L. L. Elden, V. M. Montsinger, F. D. Newbury, L. T. Robinson, W. L. Abbott, I. E. Moultrop, G. A. Orrok, D. W. Roper, P. M. Lincoln and about sixteen others.

▼

Greater New York Looks for Slash in Rates

REVISION in the near future of the electric rates of the united electric companies which serve all Greater New York with the exception of Staten Island are prophesied with the publication of a letter from Chairman Milo R. Maltbie of the commission to President M. S. Sloan of the companies and the latter's response, Mr. Maltbie soliciting and Mr. Sloan promising definite proposals for a cut in the price of electricity. Mr. Maltbie indicated to newspaper men that "nothing less than a reduction of 1 cent or 2 cents a kilowatt-hour" from the present price of 7 cents would be satisfactory to the commission. Mr. Sloan made no figures public, but expressed his desire to co-operate with the commission and dispose of a question long the subject of thought by his organization.

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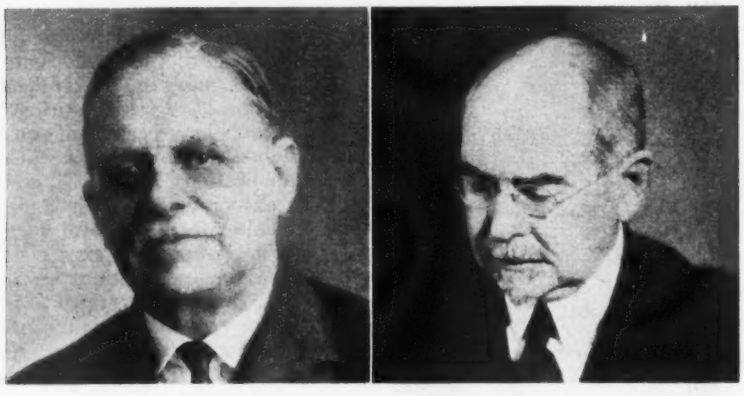
GROWN UP WITH THE ELECTRICAL INDUSTRY



Completion of their fiftieth year as electrical engineers by both Edwin W. Rice, Jr., honorary chairman of the General Electric Company (on the right), and Elihu Thomson, its chief consultant at the Lynn works, brought forth an eloquent tribute to them from Owen D. Young, chairman of the board, at a testimonial dinner held at Association Island, Henderson Harbor, N. Y., on July 27. Mr. Thomson joined what is now the General Electric Company in 1879, Mr. Rice in 1883. They have been closely associated ever since.

▼

High Tension in Italy— High-Head Plant in France

COMPLETION by the Società Idroelettrica Piemonte of a 220-kv. line for the transmission of power from the generating station of the Società Idroelettrica dell' Isarco at Cardano to the transformer station at Cislago (Saronno) is announced. This is a distance as the crow flies of about 152 miles. Actually it is much longer as the first 90 miles is in a hilly country, the line having to pass over mountains ranging from 3,000 ft. to 4,600 ft. in height. The conductors used are partly of aluminum-steel and partly of an aluminum alloy.

A hydro-electric station for the supply of power to the electrified system of the Midi Railway in France is approaching completion at Artouste in the Ossau Valley of the Pyrenees and above the existing power stations at Hourat and Miegebat. The plant, which works under a head of about 2,446 ft., comprises three 10,000-hp. Pelton turbines and generators. The power will be stepped up for transmission to 60,000 volts.

▼

Kansas Commission Recounts Achievements

RECOUNTING with much satisfaction the accomplishments of the present Public Service Commission of Kansas, appointed about sixteen months ago by Governor Clyde M. Reed, Chairman Jesse W. Greenleaf said recently that there have been reductions in electric light and power rates in 221 Kansas towns aggregating $744,988 a year. Reductions in rates for gas and other utility services made the total reduction to the people of the state more than $1,000,000.

The commission claims that it has been able to prevent every increase in rates the public service utilities have sought, except some minor adjustments to equalize the rates.

CHICAGO'S SKYLINE DURING RECENT LIGHTNING STORM

—P. & A. Photos.

Photograph taken in the midst of a July storm from the new Adler planetarium, looking across harbor waters to the mirrored lights of the outer drive and the illuminated skyscrapers of the Illinois metropolis.

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Substantial Rate Cuts Ordered at Portland, Ore.

REDUCTIONS of from 2 to 22 per cent in rates for residential service and for commercial lighting among the customers served by the Pacific Northwest Public Service Company, Portland, have been ordered by the Public Service Commission of Oregon as a result of the protracted valuation proceedings before that body in the past two years. The commission was acting on its own motion and on a petition from the city of Portland entered in April, 1928, and the first hearings were had in June of that year. Following extensive investigations by commission engineers and representatives of the city, the principal hearings were held in December and January last.

The commission sets the value of the light and power property of the company at $45,460,000. This amount was arrived at largely by bringing the 1916 valuation up to date and is about $3,000,000 less than the company figure showed. In general the rates grant the greatest saving to the smaller user, in the case both of residential service and commercial lighting service. The new rate for residence service has a top step of 5.5 cents per kilowatt-hour as against a 7-cent step in the old rate. The lowest step in the new rate is 1.8 cents as against 2 cents in the old rate. The new rate abolishes the former 5 per cent prompt payment discount. In the commercial lighting and heating schedule, which also has a top step of 5.5 cents and which gets down to 1 cent for certain kinds of use, the reduction is uniform for all customers having the same-sized load irrespective of the number of hours of use. This in effect favors the small user, providing for him a higher percentage of reduction than the large user. Estimate of the saving in these two schedules is about $228,000.

A third and entirely new rate for farm service is likewise provided in the commission order. This rate, which is optional, calls for $1.50 per month fixed charge and an energy charge of 3 cents per kilowatt-hour for the first 400 kw.-hr. and 2 cents for all energy used over 400 kw.-hr. per month, with a monthly minimum charge of $3.

The order makes the new rates effective August 15, and the company has taken steps to file tariffs in accordance with it. While the order affects only the customers of the Pacific Northwest Public Service Company, the competing Northwestern Electric Company has met the reduction and filed identical rates to take effect on the same day.

▼

Tree Planting as a Utility Activity

REFORESTATION has been pursued so vigilantly by the companies comprised in the Niagara-Hudson Power System that a total of 21,500,000 trees have been planted in its upstate New York territory. Five million more will be planted this year, official announcements say. This activity converts waste land into valuable timber land and protects the watersheds of the system's hydro-electric plants.

The Northern New York Utilities, leader in the campaign, which has been carried on chiefly in the Adirondacks, has planted 5,877,100 trees. The Malone Light & Power Company has planted 2,500,000 trees and will plant 1,000,000 more this year. The Niagara, Lockport & Ontario has planted 500,000 trees on the Salmon River watershed and will plant 200,000 more this year. The St. Lawrence Valley Power Company and the New York Power & Light Corporation also have planted many thousands of trees.

Iowa Maintains Its Saturation Record

A STATE-WIDE survey made by the Iowa Committee on Public Utility Information shows that only 24 incorporated towns in the state, out of a total of 921, do not have electrical service. Their average population is 132.

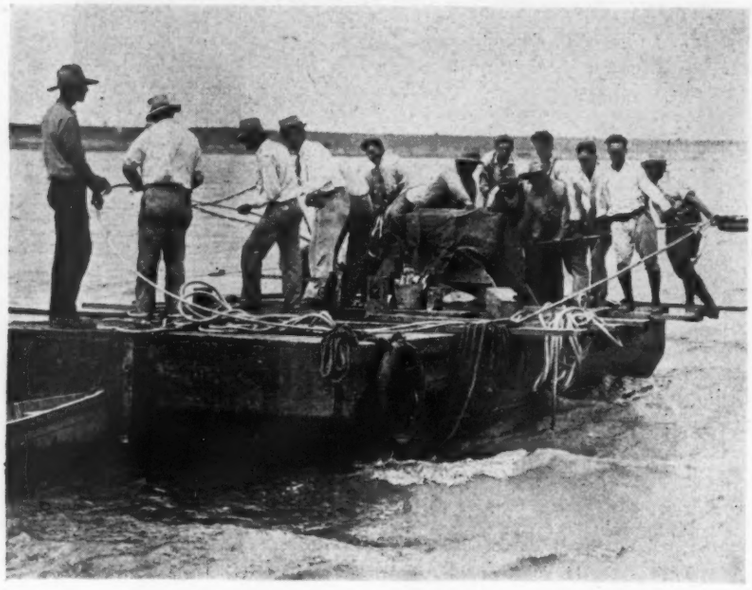
Permits issued by the Railroad Commission in 1929 for transmission lines totaled 3,750 miles, a new peak in construction activities, and brought the state's total to 13,000 miles. Thirty thousand farms in the state are now listed as receiving energy, 16,000 being served from central stations. Unique in the farm survey is the disclosure that electric ranges seem to lead in consumption of electricity, surpassing lighting. Water power produced 52.4 per cent of the total output, the Keokuk plant accounting for most of this.

▼

Los Angeles G. & E. Fears Damage by Channel Work

CONFERENCE will be had between the flood-control district engineer in Los Angeles County, Calif., and the engineers of the Los Angeles Gas & Electric Company over the company's expressed fears that the straightening of the San Gabriel River flood-control channel at Seal Beach will cause immense damage to the utility's generating plant there by causing deposits of silt and sand around the intake of the cooling-water system. E. C. Eaton, the district engineer, expresses confidence that the new channel outlet which is contemplated can be constructed without damage to the plant by an extension of the intake pipe or otherwise.

EMERGENCY POWER READY FOR NEW ORLEANS



COMPLETION of the final link in the 110-kv., 300-mile million-dollar transmission line connecting the Sterlington plant of the Louisiana Power & Light Company with the Market Street plant of the New Orleans Public Service, Inc., was announced last Saturday. Six cables cross the Mississippi River at Bonnet Carré in 3,780-ft. spans attached to 417-ft. steel towers on the river banks. The connection is intended primarily as a safeguard for New Orleans in case of emergency. The system of which the line forms part ties in with lines in Arkansas, Tennessee, Georgia, Alabama and Mississippi. In the illustration workmen on a barge in midstream are shown splicing a cable that was damaged when a ship struck it. River traffic was held up for seven hours to allow repairs to be made. (See ELECTRICAL WORLD, March 29, p. 631.)

▼ ▼ ▼

France Electrifying Her Steel Works

AS FAR back as 1918 the French Mining and Metallurgical Commission foresaw the necessity for the reconstruction of the mines and works which had been devastated in the Lorraine region and for the construction of a network to transmit electrical energy to them during the period of reconstruction. This has taken the form of a scheme whereby a permanent pooling of the means of production of electrical power is realized by running the metallurgical power stations in parallel. The transmission lines are also designed to allow of the sale of the energy generated in the power houses by surplus blast-furnace gas.

At the present time, excluding the Belgian and Luxembourg works, eight pig-iron foundries with 30 blast furnaces and twelve complete works, with blast furnaces, steel-producing plant and rolling mills, comprising 70 blast furnaces, are incorporated. These works are capable of supplying annually 7,000,000 tons of cast iron, which corresponds to a total output of 3,600,000 cu.m. of blast-furnace gas per hour. Of this it is possible to dispose of 1,800,000 cu.m. per hour for purposes other than the furnaces, equivalent to 240 tons of coal per hour. This has provided a surplus amount of energy available for sale up to 100,000 kw.

At a recent meeting of the French Institution of Electrical Engineers, held jointly with the corresponding British institution, L. A. E. Sekutowicz and A. Evain outlined the system created, which consists of an overhead-ring main at 65,000 volts joined up to the state station at Landres and to the network of the La Houve mines. The energy transmitted by this network in 1929 was 130,000,000 kw.-hr., and it is expected to exceed 200,000,000 kw.-hr. in 1931.

▼

New Transmission Line in Illinois Opposed

THE Illinois Commerce Commission last week granted the Super Power Company of Illinois permission to exercise the power of eminent domain to procure right-of-way for a 132-kv. transmission line which it will construct from its Kewanee substation through Henry, Bureau, Lee and Ogle Counties to Dixon. Condemnation proceedings will be started at once. Extensive hearings have been conducted by the commission at the company's request, landowners steadily refusing to make grants on the ground that the line would adversely affect value of their lands.

▼

Detroit Edison Plans to Rebuild Connors Creek

PRELIMINARY work in connection with rebuilding the Connors Creek power plant of the Detroit Edison Company has been started. The tentative program includes the construction of a new switch house, an addition to the present turbine room to accommodate two 60,000-kw. tandem turbo-generators, and the ultimate replacement of all present boilers and turbines.

The first section of the new switch house has been under construction for several months and the structural steel is now being erected. The roof of the present power plant is being raised and other preliminary building work has been started in connection with the replacement of present equipment. The turbine-room addition for the first two units will be started in August.

Plans are still in the formative stage, but the ultimate rebuilt plant, including the new addition, will probably contain fourteen new boilers and will have six 60,000-kw. turbo-generators and four 4,000-kw. house service units. This will double the rated capacity of the present plant. The entire project will cost approximately $30,000,000 and will require seven or eight years to complete.

▼

N. Y. Electrical Society and City Institute Merge

DESPITE strong opposition and attempted court action by a part of its membership, the American Institute of the City of New York voted last week to merge with the New York Electrical Society. The combined society will retain the name of the American Institute and carry on the program of the Institute, which was founded 102 years ago.

The merger has also been approved by the New York Electrical Society, one of the largest, oldest and best known among such electrical associations, which will permit its name to be dropped. The American Institute goes into the merger with about 400 members. The Electrical Society has 1,100

members. The officers of the American Institute will continue as officers of the combined organization and the directorate will be increased from nine to twenty-five to make room for representatives of the electrical group. Dr. H. H. Sheldon of New York University is president of the New York Electrical Society.

▼

Accept Interim Revision of Code Paragraph

OFFICIAL notice from A. R. Small, chairman electrical committee National Fire Protection Association, says that 57 members and alternates of that committee have voted favorably upon a proposed interim revision of paragraph o, Section 506 ["Underfloor Raceways"], Article 5 of the 1930 edition of the National Electrical Code, against two negative letter ballots. Accordingly this paragraph is amended by "substituting '40 per cent' for the value '30 per cent' in the third line."

As altered by this interim revision the paragraph now begins:

o. Not more than ten wires shall be placed in any one raceway, nor shall the combined cross-sectional area of all conductors exceed 40 per cent of the interior cross-sectional area of the raceway.

▼

Coming Meetings

Camp Co-operation X—Association Island, Henderson Harbor, N. Y., July 31-Aug. 4. Society for Electrical Development, 420 Lexington Ave., New York.

Association of Electragists International—Hotel Schroeder, Milwaukee, Aug. 18-20. L. W. Davis, 420 Lexington Ave., New York.

Institute of Radio Engineers—King Edward Hotel, Toronto, Aug. 18-21. H. P. Westman, 33 West 39th St., New York.

International Association of Electrical Inspectors—Northwest Section, Bellingham, Wash., Aug. 25-27. F. D. Weber, 414 Lumbermen's Bldg., Portland, Ore. Western Section, Congress Hotel, Chicago, Sept. 15-18. W. S. Boyd, 175 Jackson Blvd., Chicago. Eastern Section, Pittsfield, Mass., Sept. 22-24. R. Walker, 85 John St., New York.

American Institute of Electrical Engineers—Pacific Coast convention, Portland, Ore., Sept. 2-5; Middle Eastern district, Philadelphia, Oct. 13-15. F. L. Hutchinson, 33 West 39th St., New York.

Pennsylvania Electric Association—Bedford Springs, Pa., Sept. 3-5. Harold A. Buch, Telegraph Bldg., Harrisburg, Pa.

Empire State Gas and Electric Association—Saranac Inn, N. Y., Sept. 18 and 19; Meter Section, Watertown, N. Y., Oct. 9 and 10. C. H. B. Chapin, Grand Central Terminal, New York.

Great Lakes Division, N.E.L.A.—French Lick Springs, Ind., Sept. 25-27. T. C. Polk, 20 North Wacker Drive, Chicago.

American Electrochemical Society—Hotel Statler, Detroit, Sept. 25-27. C. G. Fink, Columbia University, New York.

National Safety Council—Pittsburgh, Sept. 29-Oct. 4. W. H. Cameron, 20 North Wacker Drive, Chicago.

New England Division, N.E.L.A.—New Ocean House, Swampscott, Mass., Sept. 29-Oct. 1. Miss O. A. Bursiel, 20 Providence St., Boston.

Illuminating Engineering Society—Hotel John Marshall, Richmond, Va., Oct. 7-10. E. H. Hobble, 29 West 39th St., New York.

Rocky Mountain Division, N.E.L.A.—Franciscan Hotel, Albuquerque, N. M., Oct. 20-22. O. H. Weller, Public Service Co. of Colorado, Denver.

National Electrical Manufacturers' Association—Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va., Oct. 20-24. A. W. Berresford, 420 Lexington Ave., New York.

Utility's Farm Sales up 43 per Cent in Year

INCREASE of 43.6 per cent in the number of its rural electric customers is reported for the fiscal year ended May 31, 1930, by the Public Service Company of Northern Illinois. In May of this year there were 5,539 farm customers on the lines of the company, compared with 3,857 at the same time a year ago. The total number of kilowatt-hours sold to rural customers during May was 309,455, an increase of 70.8 per cent over May, 1929.

That farmers in northern Illinois are taking advantage of the sliding scale of rates is indicated by the fact that, although the total kilowatt-hours sold per bill increased 18.9 per cent, the company's revenue per bill showed an increase of only 15.4 per cent for May, 1930, over May, 1929. The average rate in that month was 7.3 cents, as compared with 7.6 cents last year.

Officials of the company ascribe much of the growth of the company's farm business to the model farm which the company maintains near Mundelein, Ill. Since it was opened to the public, less than two years ago, 67,571 persons from 48 states, Alaska, the Philippine Islands and fourteen foreign countries have visited it.

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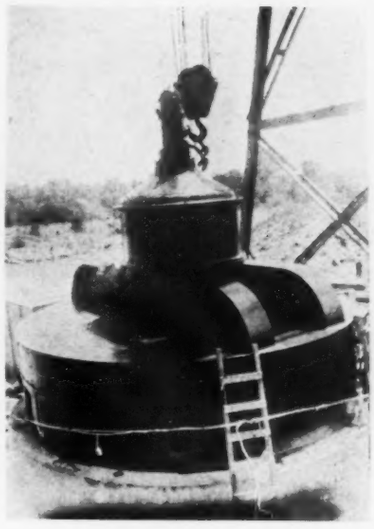
San Joaquin Builds for 220-Kv. Transmission

WORK has been completed on the San Joaquin Light & Power Corporation's new tie line between its Wilson substation at Merced, Calif., and its Ashlan Avenue substation at Fresno, a distance of 48 miles. The line is of steel-tower construction, built ultimately to carry two circuits at 220 kv., but at present carrying only one 110-kv. circuit of 60,000 kw. Constructed at a cost of $800,000, a record for the San Joaquin company was established when it was built in four months and 25 days.

Fishway Provided at New Merced Plant

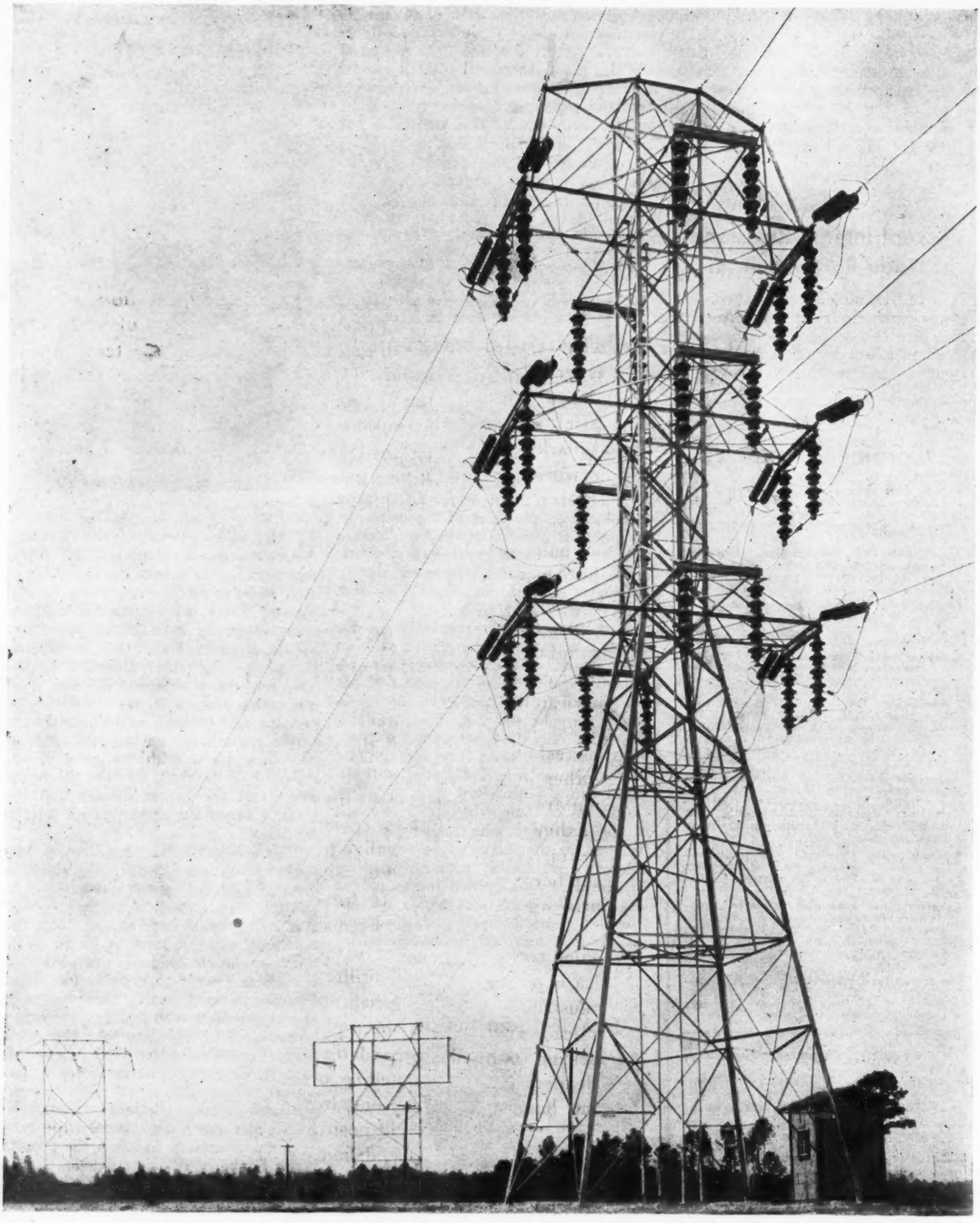


EARLY completion of the 4,580-hp. hydro-electric plant which the San Joaquin Light & Power Corporation has been building at Merced Falls, on the Merced River, to replace the 550-kw. plant originally installed 27 years ago by the Merced Falls Gas & Electric Company, long since absorbed by the San Joaquin, is announced. The most interesting feature of this small plant is perhaps the fishway to be constructed across the tailrace on the south side of the power house with the upper end at the crest of the dam, between the radial gates and the power house, and the lower end on the opposite side of the tailrace.

This fish ladder will consist of fifteen pools, each 6 ft. wide, 8 ft. long and 3 ft. deep. The length of the spillway is 3 ft. and the drop from pool to pool will be 2 ft. The total climb or rise from the tailwater to pond level is 32 ft. The intake to the fish ladder is provided with removable boards to provide for slight changes in pond level. The lower end also is provided with boards which may be removed or added to take care of a fluctuation in tailwater level amounting to 6 ft. or 7 ft. The structure is designed in accordance with the general plan and recommendations of the State Fish and Game Commission.

It was necessary to make the powerhouse intake of sufficient size to permit spacing bars as close as ½ in. apart to prevent the young salmon from being washed through the turbine on their journey to the ocean.

The illustration shows the outdoor generating unit, first of its type in California, previous to the installation of the 21-piece welded steel hood which will protect it from the elements.



Alabama Power Company *(See page 215)*

Combination Tower Dead-Ends and Switches Four Circuits

EDITORIALS

L.W.W.MORROW
Editor

Much Ado About Russia

AMERICA is awake and somewhat excited about Soviet activities and has granted a long-delayed hearing to the industrial and political program of the communists. In brief, Russia hopes to wreck the existing industrial markets by dumping her mass production on the world and thus make easy the conversion of other nations to the Soviet political belief. This program has gone so far that her coal, manganese, pulpwood and lumber have already come into the American market to the disadvantage of American producers.

And the end is not yet. Actual progress is being made in the development of manufactured products in Russia. By means of American machines, American engineers and American managers appreciable strides have been taken to get Russia outfitted with electric power, steel mills, textile mills, automobile plants and other manufacturing industries. Russian workmen are being taught mass-production processes, and they learn quite readily. In from five to ten years, at the present rate, Russia will be able to dump her products in volume into any and all world markets open to her.

Thus, in a sense, for temporary gains to individuals and to manufacturers, America is putting Russia in a position to create the industrial and political unrest in the world that her leaders believe a necessary preliminary to the setting up of a Soviet régime in all nations. Soviet leaders state openly that this is their objective and boast of their progress.

Of course, America can raise a tariff wall and prevent dumping of Russian products into this country, but if every nation of the world follows the same policy, there is little doubt that American business in the outside world will be affected seriously. It is also true that the Russian situation may not endure long enough for Soviet plans to come to fruition and that conditions are exaggerated just now, but it is the part of wisdom to look ahead and measure the future in terms of present trends. If our governmental and industrial system is sound, the best policy to undermine it is to encourage the Soviets in any of their industrial or political enterprises. Individual Americans and American manufacturers should bear this in mind when Soviet gold is offered for their products and services.

Huge Interest Saving Effected by Holding-Company Credit

OUT of the welter of federal investigation of the utilities comes a definite opportunity to present to the public the specific value and achievement of the merger movement—the holding company. That corporate enterprise is organized to realize profits is no secret and might as well be frankly admitted. But in making moderate profits for themselves the large utility systems have been valuable to the nation and to the consumer far beyond the possibilities of the small-scale utility unit of two decades ago.

Specifically, one benefit on which little emphasis has been placed is the constant reduction of interest and dividend charges through lower-coupon refunding operations. This has been made possible only by the gradual establishment of a sound credit position. It would have been impossible or very definitely limited under the old individual company system. It is saving consumers probably from fifty to one hundred millions annually. Such an economy alone, it seems reasonable to assume, probably outweighs the total of all the profits questioned in the federal investigation.

This is but a single instance of the specific bene-

fits of the holding-company system. Its amplification as just one item of benefit would aid greatly in commanding public appreciation. The Federal Trade Commission investigation offers a real opportunity to single out, one by one, the facts which will confirm the public's opinion that "benefits" offset the "damages" fully as well in utility transactions as in assessments for municipal improvements.

Co-ordinating Electrical Nerves with Vehicular Arteries

SUBSTITUTION of a network distribution in place of a radial scheme often involves a considerable change in the complexion of the duct and manhole system. These altered aspects occasionally present an excellent opportunity to impress upon the community the advantages accruing to both the municipality and the utility company when the best long-range scheme is evolved by the company and proposed to the city. Those which benefit the citizens arise from two sources. Of these the first is the increased reliability of electric service and the accompanying avoidance of the heavy investment incurred in locating substations in city areas where land is expensive. Expenditures which defer the day of reduced distribution costs are unwarranted whenever the superior network scheme can be demonstrated to be cheaper in the long run.

Often the substation scheme creates a congestion of duct lines in central streets already crowded with subsurface facilities. Moreover, the number of transformer manholes required on radial feeds usually exceeds the number adequate for the network system. Herein lies a second distinct advantage accruing to the citizens who travel on the streets—a minimized occupancy of highway space in and below the pavement. Anything tending toward reduced interference with traffic flow is certainly an asset to the cities, most of which are battling with traffic congestion.

With these factors clearly established in the minds of the municipal authorities, there should exist an excellent foundation for canvassing the possible locations of duct lines and manholes so as to be most advantageous to both interests. In some cases a central location in the highway will be best because it aligns the electric openings with the sewer vents. In others a gutter location will be better. In still others the space between curb and sidewalk offers a good solution. If trees are there to obstruct, then even the space in and beneath the sidewalk itself may be the most appropriate. But whatever the location proposed by the company or suggested by the city, it should be recognized by the latter that it, as a community, is certain to derive economic and physical benefits commensurate with those which the company will derive when new subways are proposed as incidental to a conversion to the network scheme of electrical distribution.

Will Ultra-Violet Radiations Affect Illumination Practice of the Future?

INTEREST in invisible radiation for hygienic purposes has recently centered about the ultra-violet end of the spectrum. That there are certain benefits from a proper number of given wave lengths of ultra-violet radiation is well established; that such radiation artificially produced aids proper bone growth and prevents rickets in infants and young children seems to be generally accepted by the medical profession. Other benefits indicated by certain observed facts and tests, but not yet fully proved, include such important things as a general toning up of the body and increasing resistance to disease.

Assuming the latter benefits to have been proved by future research and trial, we have visions of the working places of the future equipped with lighting systems which will furnish not only radiation of proper wave length for seeing but radiation to produce the other benefits of sunshine. The situation is full of speculative interest, both as to the light sources and as to the way they are to be used to produce a proper effect. One of the obvious difficulties of the situation would be to shed sufficient ultra-violet radiation on the workers without trouble from glare and shadows. However, for continuous exposure during a working day a much lower intensity of ultra-violet radiation would be desirable than with the present "treatment" lamps.

Another problem is that of properly disposing of or utilizing the heat which is a byproduct of the high lighting intensities now employed.

If lighting of this kind is to be the practice of the future, the designers will have all the present principles of good illumination to follow as well as the requirements of the health radiation effects desired—a task to tax the ingenuity of the best.

Saving by Load-Factor Selling

ECONOMY in the use of investments can be attained by applying both good engineering and good salesmanship. Undoubtedly major savings can be made by better layout of apparatus, better design of equipment and better arrangement of lines and stations to give electric service, but it should be remembered that the attention of executives and engineers has been focused on this aspect of the light and power business for many years and it is difficult to visualize very great investment savings for the immediate future.

On the other hand, there is an opportunity to make savings by load-factor sales. Sufficient equipment exists in stations, lines, substations and services to double the present sales of energy. Increasing the hours' use of present installations affords the greatest opportunity for economy. Granted that national domestic and industrial habits are such that electrical equipment is used on only a 30 per cent capacity basis, cannot these habits be changed if proper promotional selling is instituted and adequate financial inducements are given?

In Switzerland both industries and the homes adapted themselves to the necessities forced upon them by war embargoes. The home owners heated their daily hot water at night, and the industries shifted working hours to off-peak periods under the spur of necessity and the financial inducements offered by the electrical utilities. The light and power companies found off-peak business volume so great that rates as low as half a cent could be offered for night water-heating use as compared with normal lighting rates of 6 to 8 cents. The national habits were changed under war emergency conditions, yet, now that the war is over, the same habits prevail and Swiss utilities operate on about 60 per cent load-factor basis today. This percentage increases each year.

The example of Switzerland and a logical analysis of the present situation in this country show that attention may profitably be given to changing domestic and industrial habits in the use of electricity so that load factors will be improved. This will take organization, education, promotional selling and promotional rates. The responsibility for seizing the opportunity rests upon electrical utilities and electrical manufacturers. Such an approach to cost reduction has all possible advantages from the standpoint of both money and policy.

Extension of Chain Factories May Demand Equalized Rates

THE growth of chain manufacturing and distribution organizations throughout the country has emphasized the importance of studying every aspect of rate equalization. Competition among chain units grows keener, and the reduction or elimination of regional and district differentials in costs is now a major managerial objective of such groups. Despite the fact that the cost of electricity is generally a nominal percentage of the operating expenses of a chain factory or distributing house, the pressure upon the utilities to bring rates more or less into line in different territories is on the whole increasing.

Meanwhile interconnection is coming into the picture as a relieving factor, through its unifying capabilities. Just as railroad operation between highly diversified states tends to pool facilities for the general economic benefit, the tie line obliterates the obstacles of distance (with due allowance for losses) and by co-ordinating facilities for production effects their equivalent concentration at specified points under the conditions most favorable to lowest over-all regional costs. Larger and larger districts thus become susceptible to group treatment, and thus unification sets the stage for a degree of cost equalization.

It may be too early now definitely to evaluate interconnections from the rate equalization standpoint, and it would be unjust to insist upon immediate uniformity of power rates in districts so tied together. Unit investment charges, unit operating expenses and competition underlie such tariffs. Nevertheless, there is food for thought in the equalization potentialities of interconnection as it bears upon service costs to industries.

The Pros and Cons of

Reciprocity and Bargaining

RECIPROCITY buying and price bargaining have few friends and many enemies in the electrical industry. Almost unanimous condemnation is poured upon these practices by a representative group of electrical manufacturers commenting on an editorial which appeared in the May 10 issue of ELECTRICAL WORLD, under the caption "The Stone Age Still Persists." The consensus of opinion is that the disadvantages resulting from such policies outweigh the benefits. One or two, however, argue that reciprocity is human and is likely to continue, but feel that price bargaining should be uprooted.

Reciprocity in the meaning here used is manifested in such statements as "I buy from you, so you should buy from me," or "I will purchase from you if you purchase from me." Bargaining is illustrated by the comment, "Company A offered me a lower price; you will have to meet or better it," or "If you will give me all your business I will undercut Company A 25 per cent on this order."

In commenting upon these practices one manufacturer said: "It is common practice with many sellers to give a known price bargainer a higher price in the first place than the seller is willing to take. Sometimes the bargainer succeeds in driving the price down to the regular market level. I have known of cases, however, where the cut prices were higher than those paid by a purchaser who was known to have a policy of accepting the original prices as final. I have known of other cases where the buyer has driven the price down and the seller has shipped a less quantity of material than the order or invoice called for. This is dishonest, of course, but perhaps as economically justifiable as a strong buyer bulldozing a weak seller. It is well known, of course, that driving prices below the cost of good material means progressive deterioration in quality, which reacts to the buyer's disadvantage most decidedly."

Another manufacturer said: "In one case we placed a year's contract for our coal on a reciprocal arrangement and before the year was up we had to go out and buy coal in order to keep our plant running. We then went back to our original source of supply, and there has not been any reciprocity since then in the purchase of coal. In other words, we traded electrical apparatus for coal and gave our customer good service, but we did not receive service from the other party. We therefore believe, in our own case, that there is only one way for us to buy, and that is, from a source which can give us the quality and service that we need and then put it up to our sales department to sell our product wherever it can."

Experience has proved, particularly in this country, the economic advantages of a one-price policy strictly adhered to. Price cutting is an evil now generally recognized and is becoming less practiced except in times of acute stress, especially among manufacturers of standard products with wide distribution. Two factors are tending to stabilize price—one is the better knowledge of costs and the other is the wider dissemination of industry statistics.—*A Manufacturer.*

Reciprocity removes competition

"There is the other angle of reciprocity and that is that it more or less removes competition," said another manufacturer. "If A goes to B and says, 'I will give you an order for a lot of your apparatus if in return you will agree to purchase what you need from me,' B is immediately placed at a disadvantage because he knows what he is going to charge for the material that A wants to buy at that time, but he does not know what A is going to charge him for the material that he will want later on. Further to amplify the above, suppose a steel manufacturer sells steel to us and buys special electrical apparatus from us. We know what the market price of steel is at the time we purchase because the market is more or less established, but the steel manufacturer does not know what our price is to be when he is purchasing special electrical apparatus."

A third manufacturer reports the following experiences: "I have in mind a case where we had sold a buyer our products for a number of years. Some one in the buyer's organization then discovered that we used some of its products and asked us to buy from it because it was a good customer of ours. We had at that time a perfectly satisfactory source on the product we were purchasing, but transferred the business to our customer because of reciprocity. Our customer, of course, was asked to meet the price of his competitor, which he did. The service from the new source was not what we had been accustomed to, and upon investigation we found that subordinates handling the business felt that we had to buy from them anyway and that the price obtained was not as good as they were able to get elsewhere; consequently we were considered as a sort of fill-in. This led to our discontinuing purchasing from this source and retaliation on the part of our former customer. We

finally went back to our original source, and eventually, after trying other sources, our former customer came back to us, as he discovered that the particular service that we were rendering was what he really wanted.

"We at one time were buying a large portion of our raw material from a certain producer. Our salesman in calling on this company was told that he could not possibly jeopardize his position by buying or using any of our products because a larger competitor of ours was a better customer of his than we. We did not ask for our business on any basis of reciprocity, but purely on merit, so when this company stated that it could not buy from us because of the fear that it would antagonize a still larger customer we discontinued our purchases and found other sources who were not buying on reciprocity."

A slightly different application of reciprocity is illustrated by the following: "The conditions that confront us at the present time when selling material to the public utilities are: We are supposed to purchase stock from such companies through their various employees. If we attempt to sidestep the issue we are invariably confronted by the statement that our competitors are buying large amounts of the current stock issues and, therefore, it is only right that if our proposition should receive favorable consideration we should at least buy an equal amount. I recall within the last three or four months this condition occurring three different times, and while it is excellent practice to secure diversified ownership of stock, it is taking unfair advantage of the manufacturer to use this stock-selling scheme as a bait in order for the manufacturer to get on the preferred list of sellers."

It is difficult to see how reciprocity and bargaining can be considered together. Reciprocity seems, in our opinion, to be a perfectly legitimate procedure. While it works to the disadvantage of the small seller, because he is a small buyer, yet it is so deeply rooted financially that I do not see how it could be stopped. Often the matter of reciprocity buying is beyond control of either buyer or seller and rests with a financial group. Bargaining and its bad results, if carried too far, are within the control of the seller.—*A Manufacturer.*

Reciprocity and bargaining are different

In regard to the possibility of ostracizing reciprocity and bargaining, one manufacturer said: "It is difficult to see how these two factors can be considered together. Reciprocity seems, in our opinion, to be a perfectly legitimate procedure. While it works to the disadvantage of the small seller (because he is a small buyer), yet it is so deeply rooted financially that I do not see how it could be stopped. Often the matter of reciprocity buying is beyond the control of either buyer or seller and rests with a financial group. Bargaining and its bad results, if carried too far, are within the control of the seller. The only ligitimate reason for bargaining is through quantity buying. The large buyer is entitled to greater consideration and a large order commands a lower price than a small order. The additional discount offered for certain quantities of business are quite standard throughout all industries and there should be no occasion for a great deal of bargaining. The seller can control low prices made by his salesmen or executives by making their compensation for an order or series of orders suffer in the same proportion that the company's interest suffers. Such an arrangement naturally must also benefit the seller, the salesman, and executives for a normal or bonus price."

With regard to price bargaining, this writer says: "We believe it is the buyer's right to purchase his goods as cheaply as he can. We, of course, on a purely moral basis condemn trickery and chicanery, but on the other hand we must blame ourselves if we are susceptible to these influences. We know that in the electrical and mechanical industry, such as we are dealing with, no competitor can take business at low prices for any considerable time.

"It is not seen how reciprocity or price bargaining can be carried to an extreme. If too much reciprocity buying is attempted between certain buyers and sellers other sellers will induce the buyers to consider and buy their goods through an extremely low price or some other condition. On the other hand, prices cannot stay extremely low very long. Furthermore, buyers in general are too shrewd to let reciprocity with one seller go so far as to let other sellers feel that they do not have at least a fair possibility of obtaining business. . . . In our opinion the situation in regard to reciprocity more or less rights itself and there is no use trying to eliminate it, as it just cannot be done. So far as price cutting or bargaining is concerned, we feel that education among the sellers as to the relation of their overhead expense to their profits and prices is the only real solution to the question."

With regard to whether or not these practices are likely to be eliminated one manufacturer says: "Reciprocity enters so greatly into all relationships of life that we doubt that it could ever be entirely eliminated in business. It is a natural tendency, and unless carried to an uneconomic degree or to an extreme seriously affecting the well-being of an industry, we are not inclined to think that very much can be done about it. Furthermore, to modify successfully the practice of reciprocity you would have to deal not only with electrical manufacturers as sellers but with the entire industry to which they sell outside of the electrical industry.

"Regarding your application of the idea of bargaining, the illustration you give of buying exclusive business is obviously uneconomic and would be classed as unfair trade practice. In fact, it is covered in Unfair Trade Practice Rules, which have been recognized by a number of industries before the Federal Trade Commission. However, there would be legitimate discount for obtaining a customer's business due to a saving in competitive sales effort, a saving which may be passed on to the customer. On the other hand, it would be unwise for customers to tie themselves up with manufacturers exclusively, shut up to one source of supply, unless they could guarantee themselves definite economic advantages in so doing. Such advantageous situations would not be frequent.

"Regarding the broader phase of the bargaining, ex-

perience has proved, particularly in this country, the economic advantages of a one-price policy, strictly adhered to. Price cutting is an evil now generally recognized and is becoming less practiced except in times of acute stress, especially among manufacturers of standard products with wide distribution. Two factors are tending to stabilize price—one is the better knowledge of costs and the other is the wider dissemination of industry statistics.

"The most effective way of improving trade practices seems to us to be through trade associations, where such matters can be frankly discussed and mutual confidence developed."

One well-known manufacturer condemns the practice in very definite terms. "We have never believed in reciprocity in business; we think it is a vicious practice and that no executive worthy of the name would allow his company to be dominated by it. We say this not because we cannot see the advantages, but because we see also as clearly the disadvantages.

"The advantages are that theoretically a certain amount of business is brought to your company from the people from whom you buy. This is undoubtedly true. However, it is business which is sold without the advantages of obtaining the best product because the source is definitely fixed, obtaining the best terms because there is no desire on the part of the supplier to better his terms, and there is no possibility of commanding the service which the usual buyer can command.

"Because of these reasons there is very little doubt that the purchasing under these conditions is not done as economically as would be true were the material bought from some one who is attempting to give the best possible proposition to his customer. In the final analysis, too, if every manufacturer did the same thing there would be no possible advantage, because all could command from their suppliers proportional purchases.

"There has yet been no way discovered outside of price agreements which eliminates this possibility, hence price cutting will go on to the end of the chapter unless price agreements can be entered into, and our paternal government seems to have made up its mind that price agreements are not to be entered into. In fact, price agreements have an entire list of ills of their own which are just as serious, if not more so, so that price agreement is not a satisfactory answer, either from the customer's point of view or of good business.

"It is easy, therefore, to see that reciprocity and price cutting are foolish, poor business and should be eliminated, and there is no doubt of the fact that there is yet to be found a complete answer to the situation which would prove to all business men, no matter how short-sighted they may be, that they should be entirely dispensed with."

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Pulverized Coal-Firing Systems Compared

BIN and unit systems of firing pulverized coal are compared for performance characteristics and operating costs in a paper presented at the recent convention of the American Society of Mechanical Engineers by A. E. Grunert of the Commonwealth Edison Company, Chicago, Ill. From November, 1926, to October,

Table I—Boiler with Bin and Unit Systems Using Central Illinois Coal

Summary of Operations

	Bin System	Unit System
Steam delivered, M lb.	308,726	509,820
Coal fired, tons	20,650	34,771
Coal analysis, as weighed:		
Moisture, per cent	12.90	14.06
Ash, per cent	12.13	12.68
B.t.u.	10,626	10,314
Evaporation per lb. coal, lb.	7.475	7.332
Steam temperature, deg. F.	664	678
Steam pressure, lb. gage	311	314
Steam superheat, deg. F.	239	253
Feedwater temperature, deg. F.	189	209
Added heat per lb. steam, B.t.u.	1,191	1,178
Evaporative efficiency, per cent	83.74	83.7
Total kw.-hr per ton	50.72	51.31
Total auxiliary power, M kw.-hr.	1,047	1,784
Steaming hours	2,318	3,479
Average evaporation, M lb. per hour	133	147
Tons coal per mill-hour	10.5	9.9

TABLE II—BOILER WITH BIN AND UNIT SYSTEMS

Summary of Operating Costs

	Bin System			Unit System		
	Actual Cost in Dollars	Dollars per Ton Coal Fired	Dollars per M Lb. Steam Delivered	Actual Cost in Dollars	Dollars per Ton Coal Fired	Dollars per M Lb. Steam Delivered
Coal- and ash-handling labor	712	0.02407	0.00141	1,066	0.01748	0.00114
Boiler-room labor	4,900	0.14093	0.00960	10,387	0.17032	0.01107
Total operating labor	5,612	0.16140	0.01101	11,453	0.18780	0.01221
Maintenance, furnace	1,009	0.02898	0.00198	2,569	0.04202	0.00274
Maintenance, boiler and superheater	530	0.01524	0.00104	1,157	0.01897	0.00123
Maintenance, feeders and burners	2,403	0.06916	0.00472	532	0.00873	0.00056
Maintenance, economizer	354	0.01017	0.00069	1,430	0.02345	0.00152
Maintenance, soot blowers	251	0.00722	0.00049	3,069	0.05032	0.00327
Maintenance, air preheater	.....	.....	.....	1	0.00001	.....
Maintenance, all fans	817	0.02349	0.00160	2,410	0.03952	0.00257
Total maintenance except coal and ash equipment	5,364	0.15426	0.01052	11,168	0.18312	0.01190
Total maintenance coal and ash equipment	9,999	0.28757	0.01961	8,669	0.14215	0.00924
Auxiliary power, actual	7,684	0.22099	0.01507	12,862	0.21090	0.01371
Fuel cost	125,592	3.61196	0.24633	240,392	3.94175	0.25618
Total cost	154,251	4.43618	0.30254	284,544	4.6657	0.30324

TABLE III—COMPARATIVE DISTRIBUTED UNITS COST OF BIN SYSTEM VERSUS UNIT SYSTEM

Boiler No. 22, Calumet Station

	Dollars per Million B.t.u. Delivered	
	Bin	Unit
Coal- and ash-handling labor	0.00095	0.00120
Boiler-room labor	0.00920*a*	0.00815
Total operating labor	0.01015	0.00935
Maintenance, furnace	0.00228	0.00168
Maintenance, boiler and superheater	0.00102	0.00088
Maintenance, feeders and burners	0.00047	0.00400*e*
Maintenance, economizer	0.00126	0.00059
Maintenance, soot blowers	0.00272*b*	0.00042
Maintenance, air pre-heater	.....	.....
Maintenance, all fans	0.00214*c*	0.00136*f*
Total maintenance except coal and ash equipment	0.00989	0.00893
Pro rata share of station maintenance coal and ash equipment	0.00211	0.00233
Maintenance, No. 22 coal- and ash-conveying equipment	0.00197*d*	0.00080
Pro rata share of maintenance, crusher and breaker	0.00026	0.00318
Maintenance, mill	0.00334	0.01034*g*
Total maintenance coal and ash equipment	0.00768	0.01665
Auxiliary power	0.01140	0.01279
Fuel cost (reduced to a standard basis of $18 per 100,000,000 B.t.u.)	0.21462	0.21496
Total cost (labor, maintenance, auxiliary power, and fuel)	0.25374	0.26258

a One fireman and one mill operator for No. 22 bin sytem alone for nine months.
b Additional soot blowers installed (50 per cent of account).
c New rotor for induced-draft fan (45 per cent of account).
d Coal gates on weigh bins for tests (40 per cent of account).
e New burners (80 per cent of account).
f Repairs on spare induced-draft fan rotor (35 per cent of account).
g Unusually high maintenance costs due to changes in mill and high operating speed.

Table IV—Stokers and Pulverizer Systems Compared

	18 Stokers	No. 22, Bin System	No. 22, Unit System	Another Type, Unit System
Period covered	93 mos.	24 mos.	11 mos.	26 mos.
Total cost in dollars per 1,000,000 B.t.u. delivered, with a coal cost of $18 per 100,000,000 B.t.u.	0.26847*a*	0.25374*b*	0.26258*b*	0.26216
Evaporative efficiency, per cent	77.4	83.85	83.7	81.1*c*
Auxiliary power, kw.-hr. per ton	13.56	55.33	51.31	54.41

a Unusual expenses incurred by outages, maintenance, and renewal of all economizers included.

b Unusual expenses cited in Table III included.

c Records of the last few months indicate that rehabilitations have improved performance.

1928, data were taken on one boiler at the Calumet station of that company operating with a bin system of pulverized coal firing. Then a conversion was made to the unit system with which the boiler is now equipped.

A practically continuous series of tests was run on the boiler for the three-year period up to the present time, with the result that an exhaustive collection of data on the performance characteristics and costs of the two types of firing are now available. Some of these data which Mr. Grunert presented in his paper are reproduced here. He contented himself with setting forth only the comparison between operating records of the two systems. He indulged in no discussion of the relative merit of the two nor did he give any information on costs other than operating. These modifying considerations should be kept in mind in the study of the accompanying tables.

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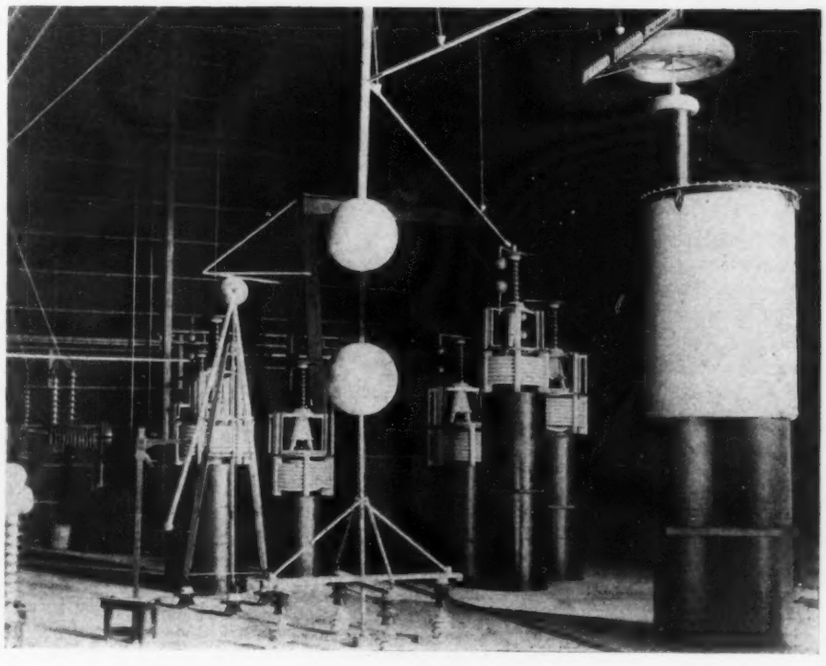
Where Many West Coast Problems Are Studied

IN THIS 1,500,000-volt laboratory of Stanford University, Palo Alto, Calif., a 0.0013 mfd. capacitor is charged from a 1,000,000-volt, 60-cycle, sine-wave (effective) transformer set through a water column resistor connected to ground in parallel with the test specimen. The charge in the capacitor is released and applied to the test specimen and water column by rupture of a meter gap between the meter spheres, thus shorting to ground both transformers and capacitor. The capacitor consists of six 175-kv., 0.0078-mfd., cable type units, connected in series. Each unit is made up of 100 ft. of cable. The resonant frequency of the capacitor as connected and ordinarily used is 630 kilocycles. The voltage time relation of the impulse voltage delivered to the test specimen depends upon the value given to the resistance in parallel with the test specimen. When the resistance is high the initial steepness of the voltage impulse will approach a limiting value of 4,000 kv. per microsecond, according to Harris J. Ryan, director of the laboratory.



400-Mile D.C. Transmission with Thyratrons Studied

BELIEVING that thyratron tubes are not confined to the function of control, and that they may become the means, at some future time, of accomplishing power transmission under more advantageous electrical conditions than those at present prevailing, an experimental miniature transmission line equivalent to 400 miles of commercial circuit has been set up in the General Electric research laboratory and equipped with thyratron tubes.

At the sending end of the line was installed a bank of thyratron tubes functioning as rectifiers, to convert alternating current into direct current for transmission purposes. At the receiving end of the line were installed other thyratron tubes which functioned, in pairs, as inverters. They inverted, or changed back, the direct current into alternating current. The source of current supply for the experimental system was a bank of transformers which furnished alternating current at 15,000 volts.

When this interesting experiment was tried, it was found that transmission of the power was accomplished without difficulty, and that the thyratrons, operating at one end as rectifiers and at the other end as inverters, handled successfully the current at 15,000 volts. At the receiving end the tubes delivered the energy to transformers, which reduced the pressure to the voltage of the working circuits in the laboratory shop, and through these circuits it was put to work in motors, just as is done in every-day practice everywhere.

As a further demonstration, the experiment was later repeated with the addition of a double-conversion process at the receiving end of the experimental line. After having been inverted and sent through "step-down" transformers, the current was passed through a motor-generator set and reconverted into direct current at working voltages. Thence it was supplied to shop circuits which required direct current, for regular work in direct-current motors.

The experiment was regarded as significant of what may be in store at some future period in the transmission of direct current for ultimate use in the form of alternating current.

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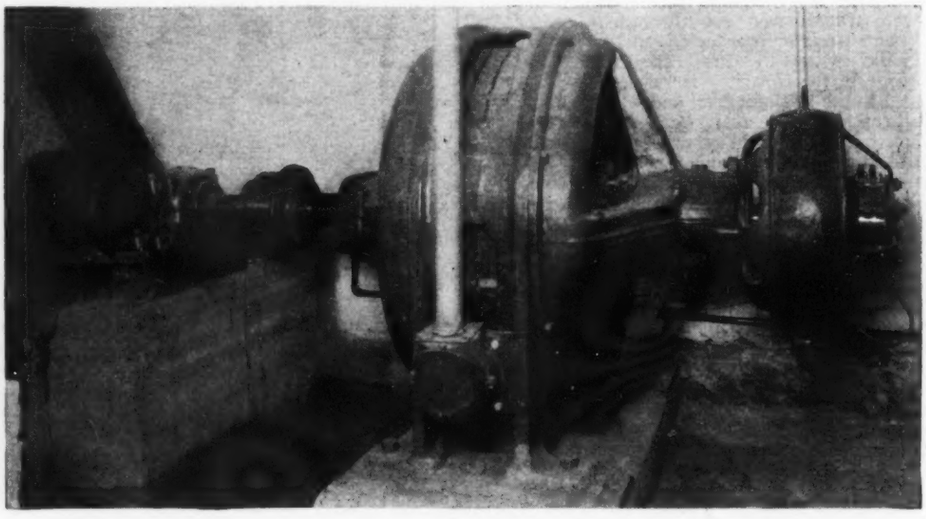
Synchronous Motor Drives Paper-Mill Beaters

WOUND-ROTOR induction motors have generally been used to drive beaters in paper mills because of severe starting torque requirements. During a week-end shut-down, for instance, beaters are sometimes left with stock in them and the mixture around the beater roll thickens and loads the motor heavily when starting on Monday morning.

Synchronous motors, with their many advantages, may now be used in such applications. The accompanying illustration shows an installation at the Smith Paper Company, Lee, Mass. Three high-starting torque synchronous motors with direct-connected exciters are directly coupled to the beater line shafts. The motors are rated 100, 150 and 200 hp., 0.8 power factor, 450 r.p.m., 2,200 volts, three phase, 60 cycles and drive two, three and four beaters, respectively.

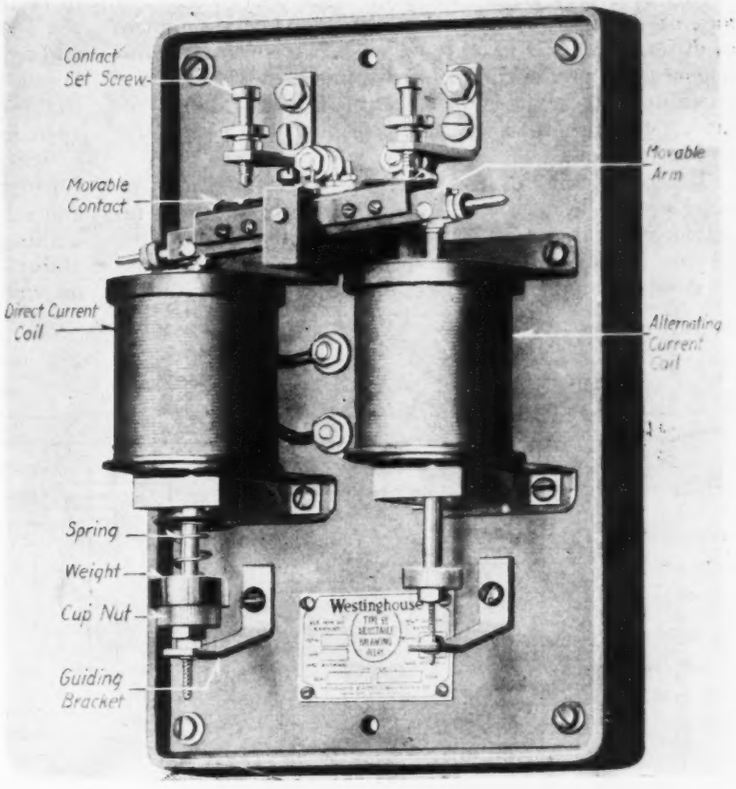
Standard full-voltage starters with push-button control are used, supplemented by a triple-pole, double-throw oil circuit breaker for reversing service. By means of this reversing equipment it is a comparatively simple matter to loosen up and start the beaters when the mixture has thickened and settled between the beater bars. This is only occasionally necessary, however. One reversal is all that is ever required to help pick up the load quickly.

In addition to the general advantages of using synchronous motors, the installation has been advantageous because of a kilovolt-ampere demand clause in the power company's contract. Results have been satisfactory both from a standpoint of torque requirements and line disturbances. The motors and control are of General Electric manufacture.



200-hp. synchronous motor and exciter, belted to beater line shaft

Simplifying Multi-Unit Load Switching



Recalibrating switching relay controlling transformer bank loading

In this relay the position of the balance pivot bar is determined by the comparative pull exerted by two independently excited solenoids. One coil is energized through parallel resistance circuits set up by auxiliaries to totalizing load relays. These circuits cause a pull on the plunger comparable to the total bus load or demand. The second coil is energized through parallel resistance circuits which are completed by breaker auxiliary switches. The pull of the second solenoid is indicative of the connected transformer capacity. When neither contact on the pivot bar is engaged, a balance between load demand and connected supply is indicated. The engaging of either contact initiates the switching sequence which, when completed, causes the re-establishment of the balance in the relay, thus terminating the operation.

By E. VERNON ELLETT

Switchboard Engineering Department, Westinghouse Electric & Manufacturing Company

A NOVEL type of automatic load control which is unusually free from complex interconnections and which is equally adapted to rotating machinery and stationary apparatus was provided for the new substation of the Boston & Maine Railroad at the Boston North station. In this installation it is necessary automatically to vary the transformer capacity connected to the railroad terminal load in accordance with the variations of the latter. The key to the scheme is a balance type recalibrating relay.

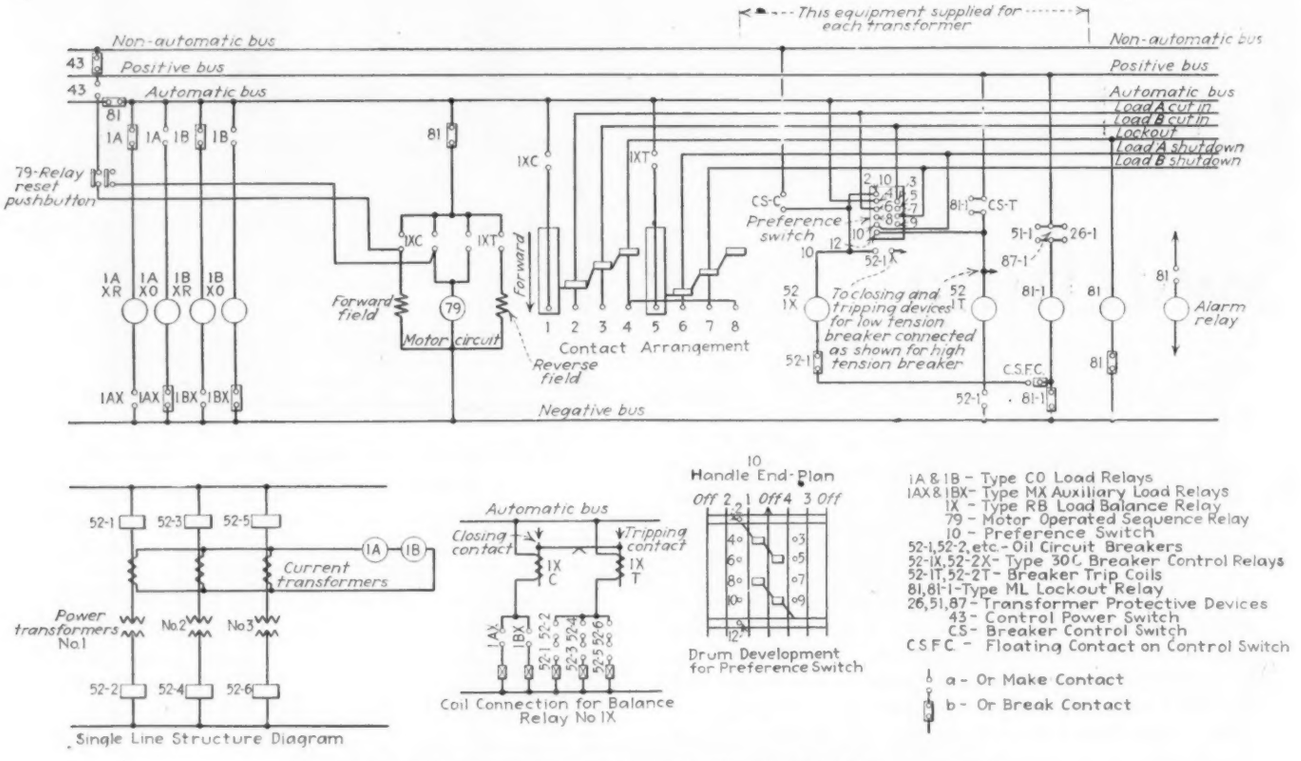
The relay functions in conjunction with a motor-operated sequence relay to carry through the switching operation required. As soon as the station is set for automatic operation the balance relay contacts, actuated by the load demand, are engaged. This causes the sequence relay to bring the first transformer bank into service. For minimum load conditions the bringing in of the first transformer bank restores the balance condition of the relay. Should the bank set for preference No. 1 not be available or should any fault occur in this or any other bank during the service period, this balance is not secured until the sequence relay has moved on and brought in the capacity required to re-establish this condition. Upon an increase in station load beyond the safe carrying capacity of the first unit, the balance in the recalibrating relay is disturbed, causing the sequence relay to operate a second time, and thus to bring in such additional transformer units as are required. If more capacity is called for than is available an alarm contact on the sequence relay indicates this condition. The sequence relay is stopped, by the opening of the recalibrating relay contacts, at a position corresponding to the connected transformer capacity.

Upon a falling off of the station load the sequence relay, which is duo-directional, is operated in the reverse direction by the recalibrating relay. Auxiliary relays disconnect the excess transformer capacity, but the first or preference unit is never disconnected due to minimum load conditions. The disconnecting of this excess capacity leaves the recalibrating relay contacts disengaged with load demand and connected capacity balanced, whether 1, 2 or 3 transformer banks are connected to the station bus. The recalibrating relay has been so designed as to require positive torque differences such as are secured by definite load changes for contact engagement. Thus hunting upon bringing in or taking out of service of units on load changes has been prevented.

Any unit may be set for preference operation. The idea of flexibility as regards the preference assignment of different units is in no sense new. However, on prior schemes the interlocking to secure this preference and to guarantee automatic replacement of faulty units required the use of a considerable network of control interconnections.

The complexity of these control interconnections on older schemes was especially noticeable on applications involving more than two load units. Under the recalibrating scheme no interconnections between various units are required and no extra connections, above those required in the control switch operation, are necessary between the switchboard and the breaker unit. All interlocking and sequence connections are confined to the main switchboard, being between the master relaying equipment and the individual sequence switches on the transformer switchboard panels.

The main factors in favor of the recalibrating scheme for multi-unit load switching of any type are positiveness and reliability of operation, general simplicity of scheme, a minimum of extra control connections and the inherent ability of the scheme to take care of and set up an alarm on unusual or fault conditions.


This equipment supplied for each transformer
Non-automatic bus
Positive bus
Automatic bus
Load A cut in
Load B cut in
Lockout
Load A shutdown
Load B shutdown
79-Relay reset pushbutton
Preference switch
Forward field
Motor circuit
Reverse field
Contact Arrangement
To closing and tripping devices for low tension breaker connected as shown for high tension breaker
Alarm relay
Negative bus
Single Line Structure Diagram
Current transformers
Power transformers No.1 No.2 No.3
Automatic bus
Closing contact
Tripping contact
Coil Connection for Balance Relay No.1X
Handle End-Plan
Drum Development for Preference Switch
1A & 1B - Type CO Load Relays
1AX & 1BX - Type MX Auxiliary Load Relays
1X - Type RB Load Balance Relay
79 - Motor Operated Sequence Relay
10 - Preference Switch
52-1, 52-2, etc. - Oil Circuit Breakers
52-1X, 52-2X - Type 30C Breaker Control Relays
52-1T, 52-2T - Breaker Trip Coils
81, 81-1 - Type ML Lockout Relay
26, 51, 87 - Transformer Protective Devices
43 - Control Power Switch
CS - Breaker Control Switch
C.S.F.C. - Floating Contact on Control Switch
a - Or Make Contact
b - Or Break Contact

Schematic diagram of automatic load-switching control

With 43 operated to automatic position; 81 in its unlatched position.

Power transformers 1, 2 and 3 set for preference 1, 2 and 3.

Breakers 52-1 and 52-2 (transformer 1) closed directly from auto-bus through studs 2 and 4 on preference switch 10 operating 52-1X and 52-2X.

Both closing and tripping contacts on 1X open (relay balanced).

Load increases beyond capacity of transformer 1, causing 1A make-contact to close.

1AX operates to latched position, feeding added current to 1XC coil.

1XC contacts engage, driving 79 drum forward.

Finger 2 on relay 79 engages with contact drum, energizing stud 2 on 10 for transformer 2 (No. 10 for this transformer being on preference position 2).

52-3 and 52-4 close through operation of 52-3X and 52-4X.

52-3 and 52-4 auxiliaries contacts feed added current to 1XT coil, re-establishing balance in 1X.

Relay 79 stops rotating; contact drum also de-energized.

Load increases beyond capacity of transformers 1 and 2, causing 1B make-contact to close.

1BX operates to latched position, feeding added current to 1XC coil.

1XC contacts engage, driving 79 drum further forward.

Finger 3 on relay 79 engages with contact drum, energizing stud 2 on 10 for transformer 3 (No. 10 for this transformer being on preference position 3).

52-5 and 52-6 close through operation of 52-5X and 52-6X.

52-5 and 52-6 auxiliaries contacts feed added current to 1XT coil, re-establishing balance in 1X.

Relay 79 stops rotating, contact drum also de-energized.

Load decreases to capacity of transformers 1 and 2, causing 1B break-contacts to close.

1BX releases from latched position, decreasing current in coil 1XC.

1XT contacts engage, driving 79 drum in reverse direction.

Finger 7 on relay 79 engages with contact drum, energizing stud 7 on 10 for transformer 3.

52-5 and 52-6 open through operation of 52-5T and 52-6T.

52-5 and 52-6 auxiliaries contacts in 1XT coil circuit open, reducing current in coil circuit and restore balance in 1X.

Load decreases to capacity of transformer 1, causing 1A break-contact to close.

1AX releases from latched position, decreasing current in coil 1XC.

1XT contacts engage, driving 79 drum farther in reverse direction.

Finger 6 on relay 79 engages with contact drum, energizing stud 10 on 10 for transformer 2.

52-3 and 52-4 open through operation of 52-3T and 52-4T.

52-3 and 52-4 auxiliary contacts in 1XT coil circuit open, reducing current in coil circuit and restoring balance coil in 1X.

Internal faults on a unit in service cause opening and lockout of breakers. Balance in relay 1X is disturbed, causing relay 79 drum to be rotated to bring in capacity to restore balance.

Should more capacity than is available be called for, sequence relay 79, through fingers 4 and 8, disconnects automatic equipment, establishes an alarm, but leaves all available capacity connected.

Is Electric Heat Economical?

ACTUAL BOOK VALUES FROM USERS OF ELECTRICITY

WHY are electric lights used in place of fuel lamps? Is it because the electric bill at the end of the month is less than the fuel bill? Not at all. Why are electric motors used in place of steam or gas engines? Is it because the electric bill at the end of the month is less than the fuel bill? Certainly not. Then why should the fact that the electric bill for heat treatment may be greater than the fuel bill be of any serious consideration?

THE reasons for the adoption of the electric light and the electric motor, as every one now knows, were that those devices accomplished results not obtainable with the former methods, and in the final analysis proved more economical. The same may be said of electric furnaces for a vast majority of the applications now available.

By WIRT S. SCOTT

Special Representative
Westinghouse Electric & Manufacturing Company, Mansfield, Ohio

UNTIL the prospective user of electric heating equipment has become as familiar with the economies of electric heating as he is now familiar with electric lights and motors something more convincing than a few remarks about the intangible advantages will have to be used. Electric heating should be sold on the basis of its economy. If a reasonable return on the investment cannot be shown, then electric heating should not be used.

In an effort to prove that an electric heating installation can be analyzed for its economic value, a survey has been made of a number of users of electric furnaces doing various kinds of heat treatment. Three to four days were spent in each plant, and as much more time in getting the accumulated data in shape and preparing reports. In every plant surveyed the greatest interest was shown and the best co-operation given. In each case access was given to the accounting and cost departments, showing complete records as to factory costs, overhead costs, investment charges, operating expenses and, in fact, all factors entering into the cost of the completed product.

The data obtained were checked by the interested company as being correct in every detail and the final report was approved by the management of the company. Prior to the investigation, the user was entirely satisfied with the product secured by electric heat treatment, but was doubtful, to a more or less extent, as to whether electric heating was really economical. Records taken from their books and analyzed for their proper value showed in each case very substantial savings heretofore unknown, due to not having all the facts together in one place where they could be seen in a definite and concrete manner.

Much of the information made available in determining operating costs was of a confidential nature, and had to be regarded as such. For the most part, however, the companies surveyed did not hesitate to release for use the major part of the data obtained.

It would seem, from results secured, that every electric heating installation can be analyzed for its real worth to the user. The user would like to know in dollars and cents just how economical is his application, and to what extent he can justify his decision to use electric heat. The central stations want satisfied customers, and want to be of service to their customers. A thorough analysis of the electric heating installations will accomplish results which may be valued at many times the cost of making such analysis, and at the same time produce information of great value in knowing the real economic value of electric heating.

In an accompanying table an attempt is made to determine the savings of the electric furnace now in use, as against the present hearth type fuel-fired furnaces of a production capacity equivalent to the present electric furnace. It is appreciated that a great saving in labor has been made in the use of a rotary electric furnace

Baldwin Tool Works

Parkersburg, West Va.

Product	High-grade shovels.
Heating process	Hardening and tempering
Fuel equipment	Natural gas, bath type lead-hardening and tempering furnaces.
Electrical equipment	Bath type, lead-hardening and tempering furnaces (same size as gas furnaces).
Natural gas	$0.325 per 1,000 cu. ft.
Electricity	$0.0125 per kilowatt-hour.

Gas Furnace Analysis

Cubic feet of gas consumed per dozen shovels heat-treated	71
Dozens of shovels produced per working hour	12.80
Cost of gas per dozen shovels	$0.0231

Electric Furnace Analysis

Kilowatt-hours consumed per dozen shovels heat-treated	4.57
Cost of electricity per dozen shovels	$0.0572

Comparative Costs

Per dozen shovels	Electric Furnace	Gas Furnace
Cost of heating	$0.0572	$0.0231
Labor, man hours per dozen	0.1155	0.1613
Pounds of lead consumed	0.29	0.72
Cost of lead	0.0178	0.045
Vessel depreciation	0.0079	0.0311
General repairs	0.0023	0.0139
Labor cost, per dozen	0.0585	0.0810
Total direct cost per dozen	$0.1437	$0.1941

Investment Charge

The three gas furnaces cost approximately $4,500 installed. The electric furnaces $7,600. With interest and depreciation at 15 per cent, the investment charges are as follows:

Gas Furnace

Annual charge	$4,500 x 0.15	$675.00
Monthly charge		56.25

Electric Furnaces

Annual charge	$7,900 x 0.15	$1185.00
Monthly charge		98.75

Summary

Complete summary of electric and gas furnaces production cost, based upon one month's production of 4,339 doz. shovels.

	Electric Furnaces	Natural Gas Furnaces
Electric or gas bill	$248.00	$100.00
Lead consumption	78.60	195.25
Labor for heat treatment	235.50	350.00
Vessel depreciation	34.22	134.80
General repairs	10.00	60.00
Air for gas furnaces		14.23
Interest and depreciation	98.75	56.25
Total	$723.07	$910.53
Monthly saving, using electric heat, including all factors accounted for by book records		$187.46
Annual savings		$2,250.0a
Return on investment, per cent		28.50

The replacement of shovels due to defects not showing up until placed in service is of many sources besides heat treatment. However, these rejects have been reduced 20 per cent since electric heat treatment was adopted.

Salisbury Axle Company

Hardening and tempering automobile axles, spindles and steering knuckles. Pusher type electric furnaces, versus oil-fired hearth type fuel furnaces.

Production, pounds per month	300,000
Fuel oil cost, per gal. tank car lots	$0.06
Electricity, per killowatt hour	$0.0117
Cost of fuel per month	$793.50
Cost of electricity per month	$636.00
	Savings Monthly
Heating cost	$157.50
Labor for heat treatment	69.70
Labor after heat treatment	650.00
Maintenance	95.00
Total, per month	$972.00

Total annual saving	$11,666.40
Total cost of installation	12,500.00
Return on the investment, per cent	93.5
Quality	A higher grade quality is being served to the trade than anticipated.
Production	Is always a definite quantity.
Floor space	Electric furnaces occupy less than one-half the floor space of the fuel furnaces and are turning out more work.
Rejections	Have been reduced from 8 per cent to zero.

Black & Decker Company

Towson, Md.

Product	Portable drills and grinders.
Heating process	Hardening, tempering, carburizing.
Fuel equipment	Hearth type gas furnace.
Electrical equipment	Hearth type electric furnaces.
Fuel cost	Manufactured gas $0.70 per 1,000.
Electricity	$0.012 per killowatt-hour.

Summarizing the tangible advantages of electric heating to Black & Decker Company, the result is as follows

1. A dependable product.
2. Laboratory precision of heat treatment.
3. Rejects due to all causes, less than one-half of 1 per cent.
4. The problem of heat treatment is entirely eliminated.
5. The metallurgist determines the time-temperature cycle of operation and the number of pieces per charge for the several hundred different parts. After this, the job of heat treatment becomes a mechanical one.
6. There have been no labor turnovers in the last three years in the heat-treating department.
7. The furnace operator's helper could take charge tomorrow and produce the same results without interruption of any kind.
8. The furnace operator says he has the best job in the plant, and is highly pleased with his working conditions.
9. The heat-treating department is located in the same room with the rest of the plant, without any discomfort to the surrounding workmen.
10. Two girls, seated within 15 ft. of the furnace, do all the testing on Rockwell machines, in perfect comfort.
11. The feeling of security in the product, in the heat-treating department, the dependability of results, the continuity of service and flow of materials through the heat-treating department, aside from all other considerations, would justify the use of electric heat if the power cost five times what it does at present.

Production and Cost Data

Total cost of electricity per electric tool is $0.0125 or 76/100 of 1 per cent of the total factory cost.

Cost of electricity per month	$115.90
Former gas cost, per month	80.00
Increased cost of electricity over gas	30.00
Net saving in labor in the heat-treating department per month, using electric furnaces	187.00
Net saving in scrappage per month	400.00
Cost of electric furnaces installed	6,000.00
Interest and depreciation, per cent	12.00
Fixed charges, per year	720.00
Fixed charges, per month	60.00
Gross saving per month (labor and scrappage), $187 plus $400	587.00
Net saving per month $587 minus increased cost of electricity plus investment charges (30 plus 60)	498.00
Annual net saving	$5,976.00
Return on investment, per cent	100
Operating months required to pay complete installation	12

Warren Tool & Axe Co.

Jamestown, N. Y.

Product	High-grade axes.
Heating process	Hardening and tempering.
Fuel equipment	Open-hearth type gas furnace.
Electrical equipment	Bath type furnaces, lead hardening and salt tempering.
Natural gas, per 1,000 cu. ft	$0.43
Electric power per kilowatt-hour	0.02

Production per month of June, 1929.

8,320 double-bit axes. 25,350 single-bit axes.

Monthly Operating Cost

	Electric Furnaces	Gas Furnaces
Electric or fuel bill	$276.00	$150.00
Labor for heat treatment	318.00	726.00
Inspection, testing, field rejects, etc.	167.00	667.00
Maintenance	159.00	14.90
Investment charge	133.00	
Added sales value of electric, (penalty for gas)		350.00
Totals	$1,053.80	$1,907.90
Yearly saving of electric furnace over natural gas	$10,249.20	
Return on the investment, per cent	114	
Net actual book profit per month (deducting sales value)	$504.10	
Net return on the investment, per cent	63¾	

Marlin-Rockwell Corporation

Jamestown, New York

Product	Ball bearings.	
Heating process	Hardening races for ball bearings.	
Equipment	Oil-fired salt baths, later superseded by oil-fired hearth type furnaces, and one rotary electric furnace.	
Production	Oil-fired salt baths	150,000 pounds per month
	Oil-fired hearth type furnaces	60,000 pounds per month
	Electric rotary	150,000 pounds per month
	Cost of fuel oil	$0.0575 per gallon.
	Cost of electricity	0.0125 per killowatt hour.

Itemized Savings of Rotary Hearth Electric Furnace Over Salt Bath Oil-Fired Furnaces

Production of 150,000 lb. per month.

Monthly Saving

Fuel bill, based on March, 1926, with a production of 140,284 lb.	$645.00
Electric bill, based on November, 1928, with a production of 140,477 lb.	450.00
Monthly saving in heating	195.00
Saving in labor for heat treatment	756.50
Saving in labor for testing	329.40
Reduction in scrappage after heat treatment	250.00
Improved quality, reducing field expense	400.00
Value of better working conditions	43.75
Value of increased production in some floor space	100.00
Value of general operating characteristics of electric furnace (ease of operation)	50.00
Saving in ventilating equipment	6.18
Time saved in safeguarding workmen	2.20
Saving in labor in starting up furnaces each morning	42.90
Saving in maintenance	442.58
Value of better shop appearance	5.00
Total monthly saving	$2,623.51
Less cost of increased supervision	110.63
Net monthly saving	2,512.88
Total yearly saving	**$30,156.56**

Itemized Savings of Electric Rotary Furnace Over Hearth Type Oil-Fired Furnaces

Production of 150,000 lb. per month

Monthly Savings

Fuel oil cost, oil at 5¾ cents per gal. plus 1.35 cents per gal. handling charges	$314.00
Electricity, at $0.0121 kw.-hr.	515.00
Difference in fuel cost	$201.00
Saving in labor for heat treating	503.00
Overhead on labor, 50 per cent	251.50
Saving in erection of new building and equipment	100.00
Value of better working conditions	30.00
Value of general operating characteristics of electric furnaces (ease of securing results)	25.00
Saving in ventilating equipment	6.18
Time saved in safeguarding workmen	2.20
Saving in labor in starting up furnaces	31.90
Saving in maintenance	16.01
Value of better shop appearance	5.00
Total gross savings	$970.79
Less difference in heating cost	201.00
Total net saving per month	**$769.79**

having automatic quench. It may be proper to raise the question as to whether this is a saving attributable to electric heating. This may be answered by the statement that when the electric furnace was installed, a supposedly equivalent capacity of modern oil furnaces was installed. The fact that they were of different types could hardly be a basis for any adjustment of actual operating costs.

Rotary fuel-fired furnaces for this work would not be considered on account of the many difficulties and uncertainties in obtaining the correct rate of preheating and soaking in definite time periods for the wide variety of race sizes to be heat treated, with a duplication of results day after day without any attention whatsoever on the part of the operator. The electric furnace lends itself to a design that removes all guesswork and becomes an automatic machine.

Tower Type Switching Station Permits Flexible Operation

BY MERELY adding four groups of gang-operated disconnects to what would otherwise be a dead-end junction tower, the Alabama Power Company has been able to obtain a variety of switching arrangements. Normally two 154-kv. lines from Martin Dam feed lines to Anniston and Atlanta separately. But either line from Martin Dam can feed both cities, all four lines can be paralleled, or Martin Dam can be disconnected and Atlanta and Anniston tied together. Buses and additional insulators which would be required in the conventional switching station are avoided in this design, which is

illustrated on page 202. It is the co-operative effort of the Southeastern Engineering Company and Southern States Engineering Company.

▼ ▼ ▼

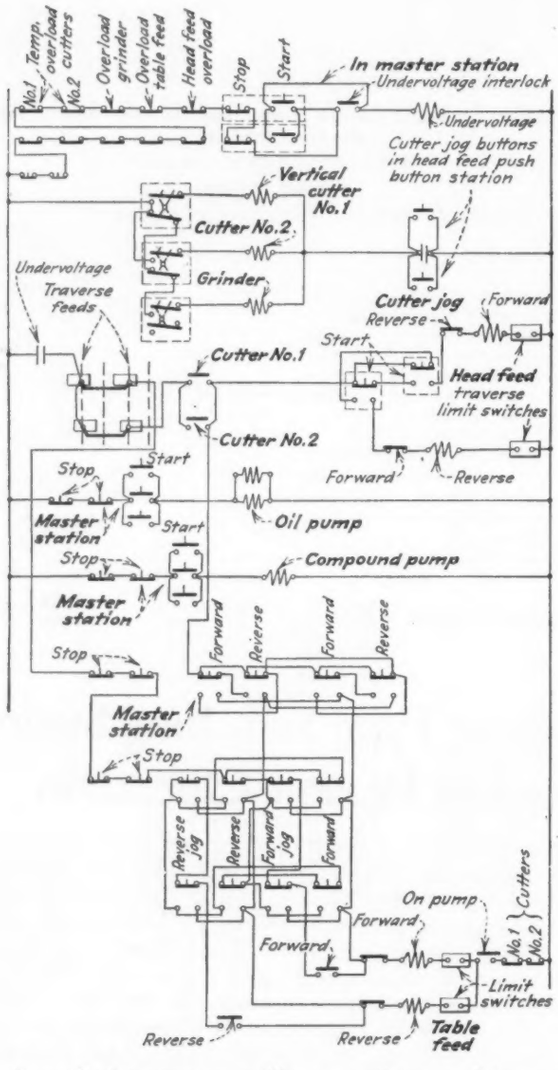
Individual Motor-Drives Speed Milling Operations

FORTY-FOUR machining operations formerly requiring from three to four weeks can now be completed in three eight-hour days by the new 72-in. milling machine built to work on centrifugal pump castings of six, seven or eight stages, and furnished the Carrier Engineering Company of Newark, N. J., by William Sellers & Company, Inc.

The Sellers principle of individual motor drive is applied throughout the machine and provides a flexible, easily handled mechanism of sturdy proportions. Each head is a complete power unit having its own motor drive by a 15-hp. motor. This arrangement makes possible the use of short shafts and spur gears in the drives and eliminates long spline shafts, bevel gears and worms.

A separate 10-hp. variable speed motor mounted at the right-hand side of the machine on the floor provides all the feeds. The same motor will also control the down feed of the crossrail. Rapid power adjustment of the crossrail is accomplished by a separate 15-hp. high-torque, constant-speed motor mounted at the top rail, and this same motor provides power traverse to the heads. This arrangement makes it possible for one head to be adjusted while the other is milling without interfering with the feed. A ½-hp. motor operates the oil pump, a 1-hp. motor drives the cutting compound pump and a 5-hp. motor furnishes power for the grinding attachment to the machine.

All motors are controlled from one panel and operated from push buttons located at a convenient place beside the table. Duplicate push-button stations are arranged in parallel on both sides of the machine for convenience of the operator. Interlocks are provided for the various motors, so that, for example, the feed motors cannot be started until the cutter motors are in motion. If an overload occurs on the cutter motor the feed motor will stop immediately. Further interlocks, limit switches and safety clutches make the machine as nearly foolproof as possible.



Interlocks protect milling machine and insure proper sequences in operation

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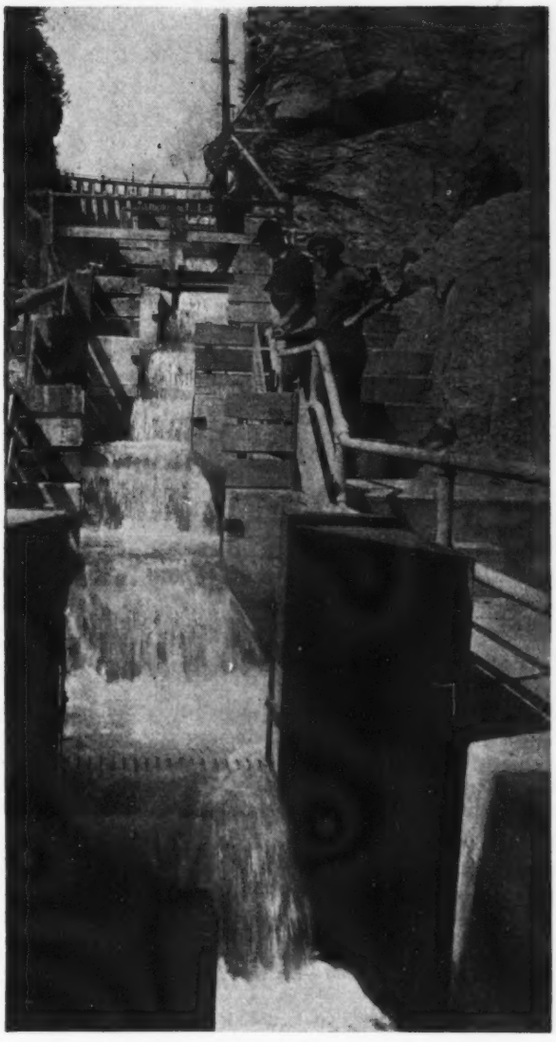
Electric Screens Divert Fish

Utilities, fishery interests and government work co-operatively in solving problem of passing fish over stream obstructions. Tests with electric screens are promising

By J. E. YATES

Pacific Power & Light Company, Portland, Ore.

FOR several years the problem of providing suitable fishways over dams in the streams of the Pacific Northwest has received a great amount of attention by public utilities interested in hydro-electric development and interests representing the fishing industry. Fresh water streams in this area contain anadromous fishes in great quantities which are born in fresh water, migrate when only a few months old to salt water, spend the greater part of their existence in the sea, and return several years later to fresh water to spawn. The habits of the fish make it necessary to provide suitable protection for both the mature and the young fish; thus the problem divides itself naturally into two subdivisions. For a good many years the mature fish have successfully been put over obstructions in fresh water streams by devices commonly called fish ladders or fishways, consisting of a series of pools arranged one above the other in steps in such a manner that water can flow through the pools and the fish makes its way by jumping from pool to pool. Ladders of this type, such as the one illustrated, if properly designed as to size of pools and location of entrance, are very successful for moderate heights. While some work has been done the last year



Fish ladder consisting of a series of resting pools at Baker River Dam in Washington

with the fish-ladder problem the greatest progress has been made in providing suitable protection for young fish on their downstream migration.

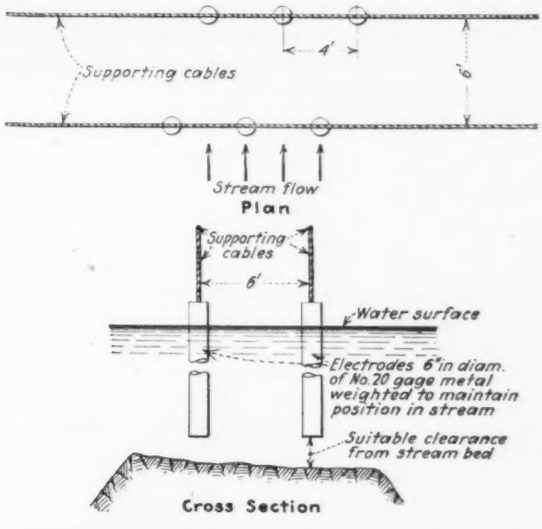
During the last few years the electric screen has received practically all the attention along this line. Several types of screen are available, one of which is here illustrated, but all accomplish the same purpose, namely, that of electrifying an area of water through which fish will not pass of their own accord. About two years ago the United States Bureau of Fisheries became actively interested in the fishways problem and in co-operation with the utilities has done considerable experimental work with this device.

The electric screen has been successful in controlling not only small migrants but mature fish as well. In 1929 an electric screen was installed in the tailrace of the Gold Ray plant of the California Oregon Power Company in the Rogue River near Medford, Ore. This stream is visited each year by several species of anadromous fish which when going upstream have found their way into the tailrace at the Gold Ray plant and waste their energies battling the turbulent water as it emerges from the draft tube. The first installation of this screen was placed a short distance above the tailrace and at a considerable angle with the flow of water so that its operation might be studied. The results were so hopeful that late in the fall it was moved to the mouth of the tailrace and installed directly across it. The early spring, 1930, run of anadromous fish in the Rogue River passed the Gold Ray plant on its upstream journey and this screen was successful in keeping the tailwater below entirely free from fish.

While the results secured along the Rogue River as far as the larger fish are concerned are very hopeful, more noticeable progress has been made with the electric screens as a means of keeping the small downstream migrants out of diversions where they may eventually lose their lives. Early in the year 1929 the United States Bureau of Fisheries installed two electric screens in the Yakima Valley near the central part of the state of Washington across the intake of canals diverting water from the Yakima River for irrigation.

A check at the end of the irrigation season showed that only 640 salmon and steelhead ranging from $\frac{3}{1\frac{1}{2}}$ to 5 in. in length were stranded in pools of one canal and 900 in the other. On a similar canal unprotected a check showed that 5,900 salmon and steelhead were stranded in pools when the water was turned off at the close of the season.

As a result of last year's work all of the diversions which were screened will be protected in a like manner during 1930 and several new screens installed on diversions formerly unprotected. Also, plans are being made to conduct further experiments with the electric screen with particular reference to its possibilities in controlling



A low potential gradient between electrodes prevents fish from passing through this screen

migration of mature fish. If it proves the success which is anticipated for this purpose it will be of great benefit in solving future fishway problems. The installation expense of the electric screen is comparatively small and its operation almost negligible. It has the added advantage also of not restricting the flow of water in the stream to any noticeable extent.

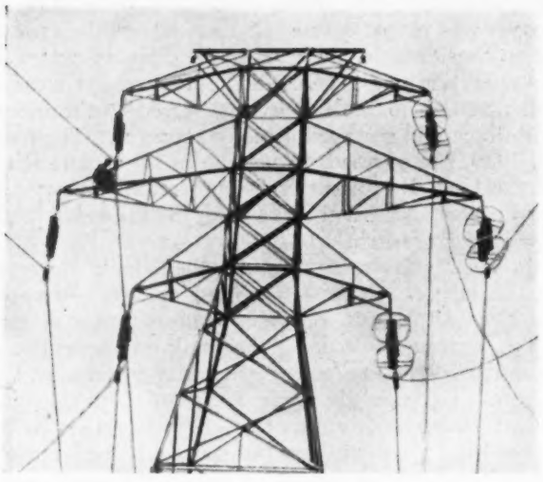


Fig. 1—Triple offset crossarms were used to care for sleet jumps

Transmission Over

By O. W. GATCHELL

Assistant Transmission Engineer
Electric Bond & Share Company, New York

LONG-SPAN, double-circuit towers with triple offset crossarms, a new combination type of tower footing, and the installation of grading shields on one conductor circuit for operating comparison with arcing horns on the other circuit are features of the design of a 110-kv., 60-cycle line between Canton, N. C., and Greenville, S. C. The line is the property of the Carolina Power & Light Company and was built in 1929 from designs prepared by the engineering department of the Electric Bond & Share Company.

The long-span tower has a triple offset crossarm to reduce conductor interference under sleet or wind storm conditions. The combination footing has a conventional grillage of short depth, to take the bearing load, attached to a Malone anchor rod, to take the uplift; the special application of this footing was at tower locations where subsurface rock occurred.

Beginning at Canton, the line follows a southerly direction and for 40 miles out of a total length of 50 miles traverses the rugged Blue Ridge mountain region. Where the line crosses the Pisgah National Forest, at an elevation of 4,500 ft., it passes between the highest peaks in the United States east of the Mississippi River. The location is characterized by a wide range of soil conditions, steep ground slopes and a "washboard" profile with abrupt changes in elevation, as described in Table I and shown in Fig. 2.

The steel towers, all of the self-supporting type with square bases, are classified in the four types summarized in Table II.

The structures carry two three-phase circuits of 250,000-circ.mil stranded copper cable and two overhead ground wires of $\frac{7}{16}$-in. diameter high-strength steel strand, extra galvanized. Ground wires are supported in clamps at all towers. Telephone service is provided by carrier-current equipment.

A first-class operating line was the design objective. Line outage means load dislocation; further, this line is so difficult of access as to preclude quick repairs. To

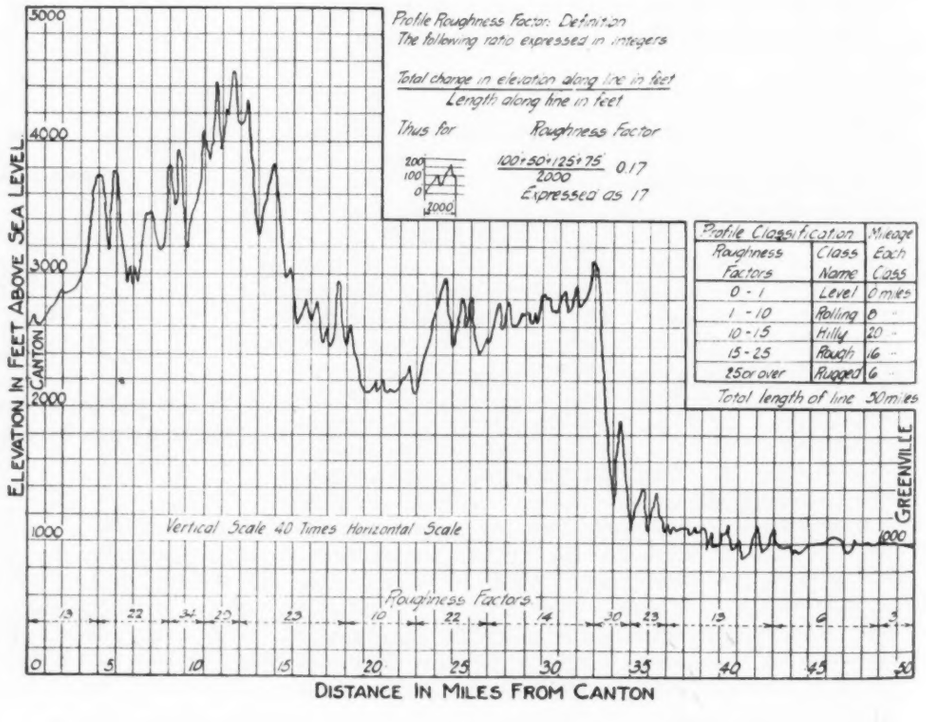

Profile Roughness Factor Definition
The following ratio expressed in integers
Total change in elevation along line in feet
Length along line in feet
Thus for
Roughness Factor
100+50+125+75 / 2000 0.17
Expressed as 17
Profile Classification
Roughness Factors
Class Name
Mileage Each Class
0 - 1 Level 0 miles
1 - 10 Rolling 0
10 - 15 Hilly 20
15 - 25 Rough 16
25 or over Rugged 6
Total length of line 50 miles
ELEVATION IN FEET ABOVE SEA LEVEL
CANTON
GREENVILLE
Vertical Scale 40 Times Horizontal Scale
Roughness Factors
DISTANCE IN MILES FROM CANTON

Fig. 2—Profile of 110-kv. Canton-Greenville line shows wide variation in elevation

the Blue Ridge

obtain good long-term mechanical performance the following design limits were applied at the assumed maximum load conditions: The standard type A tower was required to take one broken conductor, insulator stress was held to one-third of ultimate strength and conductor stress was limited to one-half of the ultimate strength. Under normal conditions (60 deg. F., bare wire) the corresponding values were: Type A tower was good for two broken conductors, the insulator stress was about one-seventh of the ultimate and the conductor stress was less than 40 per cent of the elastic limit.

Previous experience in this region had demonstrated that a choice of footings limited to the standard grillage and Malone types did not economically satisfy all the ground conditions encountered. When enough ledge rock occurred to prevent drilling a 6-in. diameter hole on the batter for a standard Malone anchor the excavation of such material for a full depth grillage was naturally expensive. To meet this situation the combination footing shown in Figs. 3 and 4 was developed.

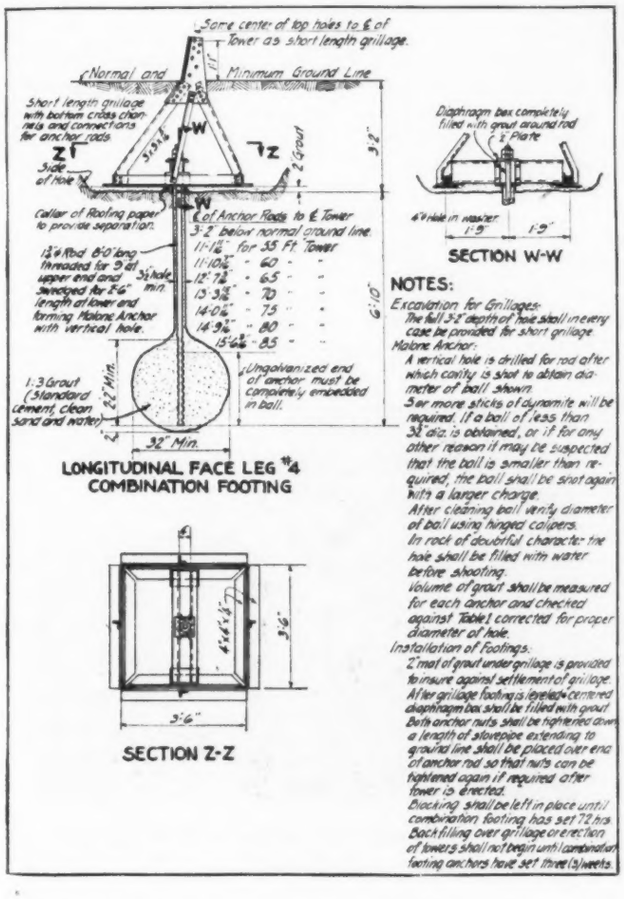

Some center of top holes to ℄ of Tower as short length grillage.
℄ Normal and
Minimum Ground Line
Short length grillage with bottom cross channels and connections for anchor rods
Z
Z
W
Tz
2 Grout
3'8"
Collar of Roofing paper to provide separation.
W
℄ of Anchor Rods to ℄ Tower 3'-2" below normal ground line.
1¼" Rod 8'0" long threaded for 9" at upper end and swedged for 5⅛" min. length at lower end forming Malone Anchor with vertical hole.
3½ hole
11'-1⅝" for 55 Ft. Tower
11'-10¾" - 60 - -
12'-7¾" - 65 - -
13'-3⅝" - 70 - -
14'-0¼" - 75 - -
14'-9⅛" - 80 - -
15'-6" - 85 - -
6'10"
Ungalvanized end of anchor must be completely embedded in ball.
1:3 Grout (Standard cement, clean sand and water)
2'2" Min.
2'
3'2" Min.
LONGITUDINAL FACE LEG "4" COMBINATION FOOTING
3'6"
3'6"
SECTION Z-Z
Diaphragm box completely filled with grout around rod
2 Plate
6" Hole in washer
1'-9"
1'-9"
SECTION W-W
NOTES:
Excavation for Grillages.
The full 3'8" depth of hole shall in every case be provided for short grillage.
Malone Anchor.
A vertical hole is drilled for rod after which cavity is shot to obtain diameter of ball shown.
5 or more sticks of dynamite will be required. If a ball of less than 32" dia. is obtained, or if for any other reason it may be suspected that the ball is smaller than required, the ball shall be shot again with a larger charge.
After cleaning ball verify diameter of ball using hinged calipers.
In rock of doubtful character the hole shall be filled with water before shooting.
Volume of grout shall be measured for each anchor and checked against Table 1 corrected for proper diameter of hole.
Installation of Footings.
2" mat of grout under grillage is provided to insure against settlement of grillage.
After grillage footing is leveled & centered diaphragm box shall be filled with grout.
Both anchor nuts shall be tightened down.
A length of stovepipe extending to ground line shall be placed over end of anchor rod so that nuts can be tightened again if required after tower is erected.
Blocking shall be left in place until combination footing has set 72 hrs.
Backfilling over grillage or erection of towers shall not begin until combination footing anchors have set three (3) weeks.

Fig. 3—Combination footings used on type B towers in rock locations

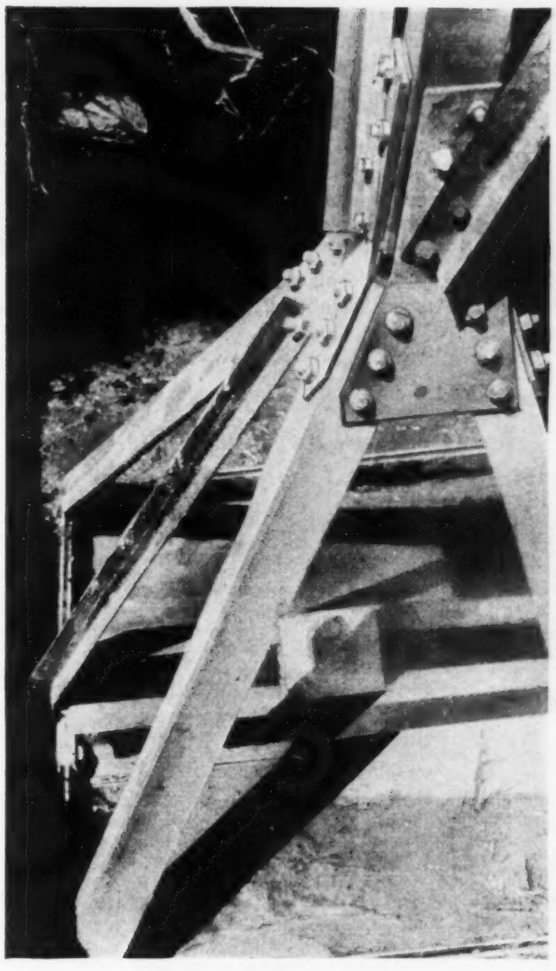


Fig. 4—View of combination footing before back-filling

At the top the footing consists of a short grillage, 3 ft. in depth, held down at the bottom by a Malone rod anchor. The small amount of excavation for the short grillage occurs immediately below the surface. The hole for the Malone rod anchor differs in two important respects from that required for a standard Malone angle anchor: the diameter is smaller, only 3 or 3½ in., and it is installed vertically instead of on a batter.

Because of these features the hole was drilled with a single rig, and regardless of nature of rock encountered the drill crew was able to put down the vertical hole to line.

The combination footing was limited in application to tower locations with 40 per cent or more rock. At such locations the saving in labor more than offset the cost of additional material required, with the result that in heavy rock the over-all footing cost averaged 15 per cent

lower for the combination type than for the standard grillage. As shown in Table III, the combination footing was limited to the types A and B towers, which were the only types suitable in respect to loads, and of frequent enough occurrence along the line to warrant an additional kind of footing.

After the towers had been spotted on the profile a soil survey crew went over the line well in advance of construction and thoroughly examined the ground at tower locations. Subsurface conditions were explored with hand augers and occasional test pits were put down. A particular type of footing was then selected for each type A and B tower location. Different tool rigs were required for each of the three footing types, and with tower locations hard to reach because of lack of roads in the mountains, every effort was made to give the construction crews well-determined footing types and avoid changes during installation.

Another characteristic of the rugged country crossed by the line was the steep ground slopes encountered at tower locations. There were few level spots over the rough section of line and it was seldom possible to choose these for tower sites.

A difference of 15 ft. in surface elevation of ground between two legs of a tower was not uncommon. In order to fit the towers closely to such ground and avoid excess excavation, single legs of different lengths were provided. The legs were attached in any combination of 5, 10, 15 and 20-ft. lengths at the bottom of a standard tower section or a 15-ft. tower body extension. The leg lengths required at irregular locations were determined in the office by small scale side-hill and tower templates. Legs of unequal length were used at 70 per cent of the tower locations.

At 30 per cent of the locations, where the ground was level, the towers were equipped with legs of equal length. The normal height of tower at such locations was obtained with a set of 15-ft. length legs, as shown in Fig. 5.

It was not practical to avoid spans from 1,000 to 1,800 ft. in building this line across the western North

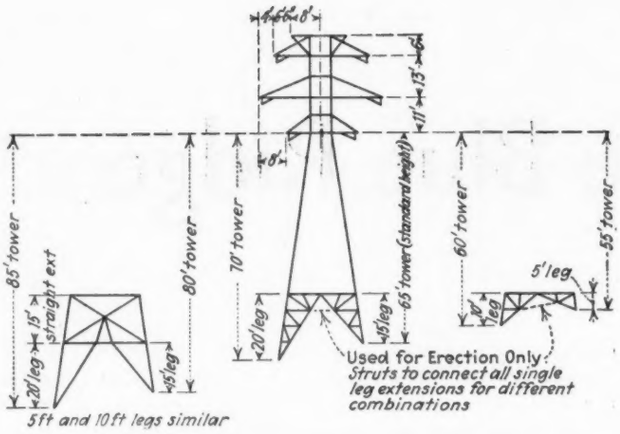


Fig. 5—Type B tower design—15-ft. body extension and 5-ft., 15-ft. and 20-ft. legs.

Table I—110-Kv. Greenville-Canton Line Characteristics

Profile Characteristic	Corresponding Design Provision	Design Applied to
1. Soil Conditions		
Loam and clay	Malone footing	Type A, B, towers
Sand and loose stone	Grillage footing	Type A, B, C towers
Ledge rock, sand stone	Combination footing	Type A, B towers
2. Steep Ground Slopes		
Irregular surface at tower locations	5, 10, 15 and 20-ft. single leg extensions to fit towers closely to ground	Type A, B, C towers
3. "Washboard" Profile		
Small hills or peaks 1,000—1,800 ft. apart	Towers with triple offset crossarms for long spans	Type B, C towers
4. Abrupt Changes in Elevation		
Towers unavoidable at moderately low points	Suspension tower with large allowable angle of insulator side swing	Type "A" tower 12 in. bracket type; "B" tower, 23-in. bracket.

Table II—Tower Data on 110-Kv. Greenville-Canton Line

Tower Type	Total Number Used	Weight Without Footings, Lb.	Actual Average Span, Ft.	Tower Description
A	149	4,800	783	Straight line—Suspension insulators, standard offset crossarms.
B	119	9,200	960	Long span—Suspension insulators, triple offset crossarms.
C	26	14,200	1,133	Medium angle—Tension insulators, triple offset crossarms.
E	4	16,600	900	Heavy angle and dead-end tension insulators.
	298		885	

Table III—Footings and Anchors for 110-Kv. Greenville-Canton Line

Footing Material for One Type "B" Tower

Material Item	—Type of Footing— Grillage	Combination
Grillage steel	1,921 lb.	2,021 lb.
Anchor steel	.....	1,104 lb.
Grout	.....	2.0 cu.yd.
Dynamite, 40 per cent rock	(3)	(1)
Excavation	35 cu.yd.	10 cu.yd.

Number of Footings of Each Type Used on Line

Type of Footing	—Type of Tower— A	B	C	E	Per Cent of Total
Malone	82	30	..	..	38
Grillage	34	40	26	..	34
Combination	25	40	..	..	22
Mixed	8	9	..	..	5
Stub	...	..	..	4	1
Total	149	119	26	4	100

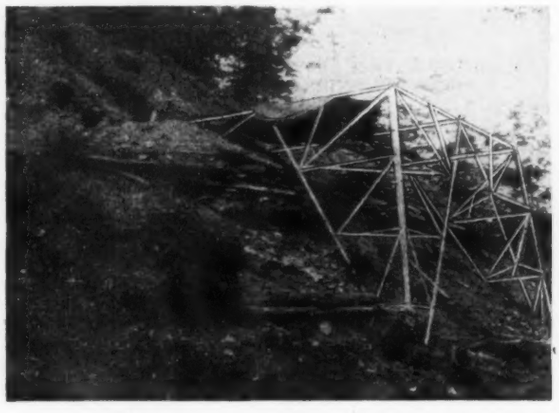


Fig. 6—A side-hill tower with 5-ft. and 20-ft. legs

Carolina mountains. With the entire line in ½-in. ice loading territory, where sleet storms were not unusual, it was recognized that the long-span tower required more than the usual 2½-ft. middle crossarm offset. A triple offset crossarm was developed for the type B tower to permit double circuit suspension construction on spans up to 1,800 ft.

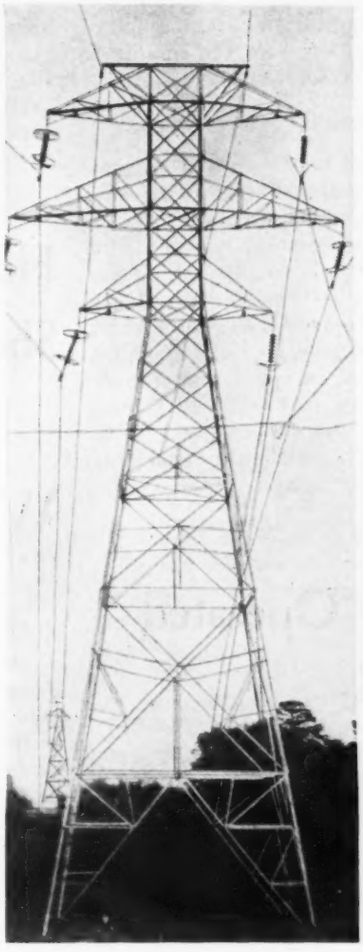
As shown in Fig. 5, the end of the top arm is offset 4 ft. and the bottom arm 8 ft. with respect to the middle crossarm. This arrangement is intended to minimize interruptions from sleet jump.

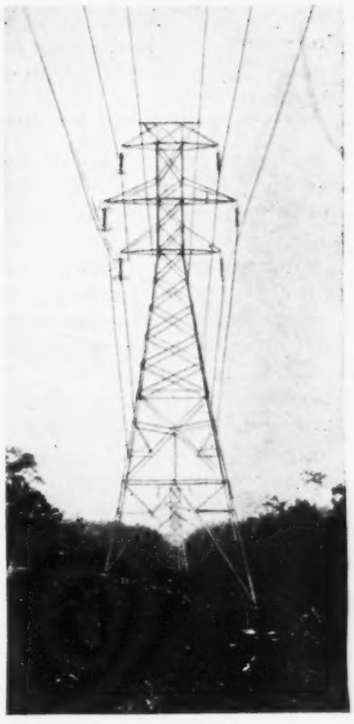
The short-length crossarm was placed in the bottom position on account of ground clearance below lowest conductor where side-hill slopes crossed the line; this feature determined the relative position of the different length crossarms. It followed that with the medium-length instead of the long-length crossarm in the top position a smaller torsion load was put in the tower.

The use of 23-in. crossarm brackets permitted a large allowable angle of insulator side swing on the type B tower; line angles up to 10 deg. were taken with the insulators in suspension position and the tower was also used on tangents at moderately low points on the profile where a short vertical span occurred together with a long horizontal span. Out of a total of 119 B towers on the line, seven towers, although not required by span or profile conditions to be type B, were installed as such to maintain a uniform conductor and ground wire separation between adjacent required towers of the same type; 86 towers were used on spans from 1,000 to 1,800 ft., six on angles, four at transposition points and the balance of sixteen towers at low points on the profile.

Summarizing, the long-span type B tower with triple offset arms was employed on sections of the line where span and profile conditions precluded the use of the normal span type A tower with standard crossarm arrangement. A comparison between these two suspension type towers is afforded by Figs. 7 and 8. A change in conductor separation occurred in passing from each section of line spotted with type A towers to the adjacent sections spotted with a succession of type B towers. However, no conductor crossings occurred in such transition spans because the middle conductors were carried on the long-length crossarm on both tower types.

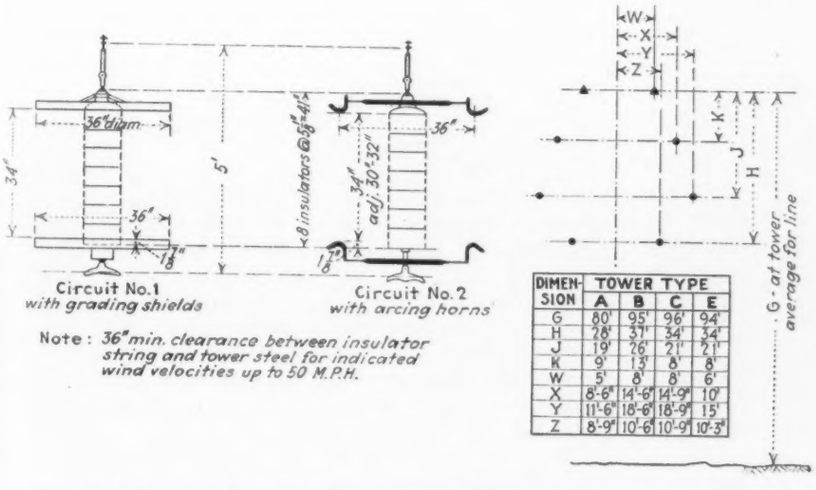
The profile was spotted with 120 deg. F. hot sag templates, using one of three curves over each section of line between dead-end towers. Sags for stringing the wire in the field were taken from the sag chart corresponding to the curve with which each particular section of line was spotted. Each of the three curves was limited in use to an end limit span where the increased vertical component due to steepness of profile gave a maximum resultant tension of 5,500 lb., as compared to the 5,300 lb. value at the ruling span. More than one sag curve was necessary because the profile over different sec-





Figs. 7 and 8—Types A and B towers for 110-kw. line

Note grading rings on one circuit and arcing horns on the other.



DIMENSION	TOWER TYPE A	B	C	E
G	80'	95'	96'	94'
H	28'	37'	34'	34'
J	19'	26'	21'	21'
K	9'	13'	8'	8'
W	5'	8'	8'	6'
X	8'-6"	14'-6"	14'-9"	10'
Y	11'-6"	18'-6"	18'-9"	15'
Z	8'-9"	10'-6"	10'-9"	10'-3"

Fig. 9—Suspension insulator assemblies and arrangement of conductors and ground wires

tions of line was so steep as to require reduced sag values to maintain allowable maximum stress in the conductor under assumed "heavy loading" condition.

Line insulation

The conductors were supported by standard 10-in. suspension disk insulators. Single and double string suspension assemblies had eight unit strings, as shown in Fig. 9; the double string tension assembly had nine unit strings. An interesting feature of the insulation was the application of grading shields to the assemblies on one circuit and of arcing horns to the asemblies on the other circuit as a means of protecting the conductor against burning from power arcs. It is expected that a comparison of the relative value of the two means of protection will be available after a few years' operation. T. C. Wescott and W. E. Day of the Phoenix Utility Company suggested the combination footing design.

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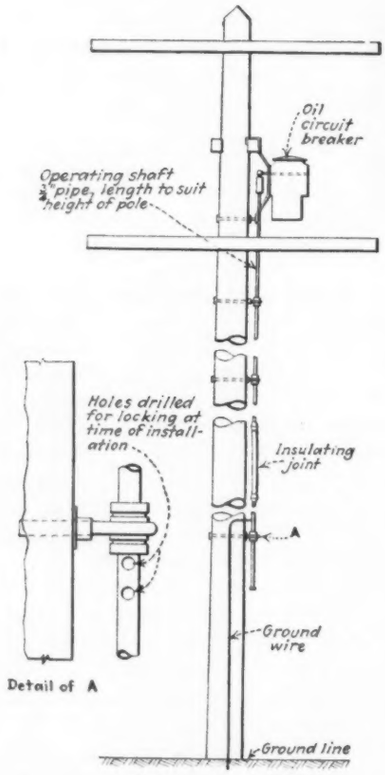
Pole-Top Breaker Operated by Extension Rod



Breaker operations may be conducted from ground level

SAFETY, service and accessibility are all involved in an ingenious, yet simple, device designed by the Dayton Power & Light Company for the operating of such oil circuit breakers as may be installed at the tops of poles. The device is simply a piece of ¾-in. galvanized pipe extending from the operating lever of the circuit breaker to within the reach of a man standing on the ground, together with the fixtures necessary for its operation. A wire connecting the pipe to ground makes the device electrically safe to operate; thus the operator is safe from the hazards of encountering high voltage as well as from the hazards of climbing. Holes drilled in the pipe below the lowest support afford the locking facilities for the shaft.

This type of mounting can be applied to present oil switches by changing the operating lever of the switch. According to Ray Johnston, general foreman overhead line department, Dayton Power & Light Company, several switches of this type which that company has in actual operation have proved entirely satisfactory.

▼ ▼ ▼

How Many Foot-Candles Should Be Used?

By M. LUCKIESH
Director Lighting Research Laboratory, Nela Park, Cleveland

WHEN the lighting specialist advocates increasing the level of illumination of a particular installation, he must be prepared to answer two questions of primary importance:

1. What will be the cost of the better lighting?
2. What benefit will be obtained from it?

The cost of the lighting can be computed exactly, but its value to the user has not been reduced to such a definite and numerical basis. Therefore, "cost," by reason of its preciseness, is overemphasized in comparison with "value," which is presented only indirectly and far less simply.

An analysis of fundamental visual data has been made and the results presented herewith for the purpose of simplifying the presentation of the value of better lighting. Quantity of light is one of the few means of improving vision and visibility. If we arbitrarily assume, as a practical expedient, that the full beneficence of higher levels of illumination is reached at 100 foot-candles, the value of any other level of illumination can be definitely expressed. For each initial level of illumination in the accompanying table the improvement in visibility obtainable by increasing the "initial foot-candles" to 100 foot-candles is taken as 100 per cent. On this basis the relative improvement for intermediate levels of illumination is presented.

Initial Foot-Candles		New Levels of Illumination (Foot-Candles) Per Cent of Possible Improvement in Seeing					
4	(Foot-Candles)	6	8	10	12	16	20
	(Per Cent)	19	31	40	47	57	64
8	(Foot-Candles)	12	16	20	24	32	40
	(Per Cent)	23	37	48	54	65	73
12	(Foot-Candles)	18	24	30	36	48	60
	(Per Cent)	26	41	52	61	74	82
16	(Foot-Candles)	24	32	40	48	64	80
	(Per Cent)	27	45	57	68	81	91
20	(Foot-Candles)	30	40	50	60	80	100
	(Per Cent)	28	49	64	74	89	100

For example, if a 4-foot-candle installation is replaced by a 10-foot-candle system 40 per cent of the aid that light can give to the eyes is obtained. If the level of illumination is raised from 4 to 16 foot-candles 57 per cent of the possible benefit is obtained. Similar data are presented for initial installations from 4 to 20 foot-candles. In each case the improvement in seeing to be obtained from quantity of light is taken as 100 per cent. The 100 foot-candles is merely an arbitrary limit for the present purpose.

"SELLING" the Salesman

ONE OF THE MOST troublesome problems met with in utility merchandising — salesmen's compensation — seems to have been solved satisfactorily in the gas sales department of a large combination gas and electric utility. The plan as herein outlined was put into effect two years ago.

ITS FEATURES are a guaranteed minimum, a commission based on value of the load, a percentage of gross profit on the sale, a percentage of the down payment and special temporary bonuses. Thus it recognizes the important factors to be considered in the sale of appliances that utilize commodities such as gas and electricity.

THE PLAN has proved so satisfactory and is so admirably suited to the merchandising of electrical appliances that it is here presented for the benefit of commercial and merchandising managers who are interested in the subject of salesmen's compensation.

WHAT basis of compensation to use for appliance salesmen is a problem upon which the Public Service Company of Colorado, in common with other utilities, has spent much thought. Two years ago a plan was inaugurated in the gas sales division of this combination utility which makes the salesmen's interest identical with that of the company. The difficulty has always been that the salesman was not entirely "sold" on his job; he did not have the company's interest sufficiently at heart and would often resort to sharpshooting and high-pressure methods.

If the high-powered salesman were a loser in unsatisfactory transactions along with his employer, he would be reasonably sure of a permanent sale before having the order placed on the books. With a compensation set-up making the salesman's interest and that of the company as nearly identical as possible, temptation to draw down permanent commissions on deliberately temporary installations would be removed.

Roy. G. Munroe, manager of the gas new-business department, asserts that his organization has always been singularly free from sharpshooting experts. He believes that trial installations offer splendid opportunities to sell needed and desirable appliances, but that a commission provision that makes the salesman's compensation contingent on profitable business for his company is a sort of "anchor to windward." It curbs overoptimism, it inspires the use of sound judgment and it may even cause the salesman to become overcautious in his promises and demonstrations. Nevertheless, it is in line with a general scheme to unify the best interests of employer, employee and customer.

The general set-up as worked out by Mr. Munroe eliminates most of the evils that attend both straight commission and flat salary agreements. Careful examination of the plan reveals nothing that would prevent it from becoming adaptable to electrical sales organizations. Although devised merely as an experiment, it has produced highly gratifying results during two years of operation. Analyzed and condensed, the basis of the plan is:

Basis of plan

First—A substantial monthly drawing account, or guaranteed minimum, against which all commissions are applied.

Second—A revenue or load-building commission, varying in amount according to the revenue value of equipment sold, taking into consideration annual gross revenue, annual net revenue and load characteristics.

Third—A percentage of the gross profit resulting from merchandising sales.

Fourth—A percentage of all cash-down payments collected with orders.

Fifth—Special temporary bonuses applied or taken off at any time for such purposes as special drives on certain appliances, introduction of new equipment, the disposition of obsolete stock, or the penalizing of certain undesirable merchandising activities.

Almost automatically, the compensation method reduces selling expense. In the house-heating division, which began operating under this system January 1, 1928, more than 7,000 all-gas customers have been secured at a selling expense of less than $10 each during the first year, and at a much lower figure in 1929. Industrial and commercial branches, starting several months later under the new plan, showed sales increases in 1928 of 82 per cent over 1927. The 1929 increases over 1928 will probably be about 50 per cent. It is significant, too, that industrial and commercial new-business expenses decreased 46 per cent during the first eight months of operation under the new schedule, with a further gratifying trend in the first eleven months of 1929, and salesmen's pay checks increased 43 per cent. Also much more desirable load was procured.

Gross profit commissions running as high as 40 per cent are being paid. This means that the salesman shares with the company in the effects of his dealings upon gross merchandise profits and losses on a 40-60 basis. Putting him thus into partnership on such a high percentage basis sharpens his trading effectiveness immensely. At the same time all appliances and installations are sold upon fixed standards and schedules, additional volume through reducing selling prices being sought. Gas-revenue commissions are based on the increased annual revenue value of each piece of equipment and vary from as low as 1 per cent on poor load factor, low sales resistance or dump-rate contracts to as high as 50 per cent in certain instances of off-peak, high yield, high sales resistance orders. A 5 per cent commission is paid on all cash collections turned in as down payments in advance of the execution of the orders.

The accounting angle of such a system would appear to hold some complications, but it has not proved difficult. Commissions are not computed on each sales; all items are simply listed in a commission ledger and the percentages for each salesman are computed at the end of each month.

It is noticeable that "gross" profit is stressed in the compensation set-up. By gross profit is meant the difference between the selling price of equipment and the total costs of appliances and installations. These costs include such items as freight, cartage and fitting-shop expenses, but do not cover such expenses as commissions, office expense, advertising, etc. Refunds resulting from adjusting misunderstandings with customers are charged against the salesman's gross profit for the month, as well as depreciation in connection with returned appliances.

Both sides benefit

The plan has quite effectively proved that paying a portion of the merchandise gross profit to the salesman improves his ability to overcome customers' objections, surmounts obstacles, betters his selling technique and makes of him a better business man. Since inauguration of the new compensation policy, requests for larger allowances on old equipment taken in exchange for new merchandise have almost disappeared. It is now common practice to give allowances for old appliances much less than the maximum permitted in the company's schedule, whereas when these same sales representatives were on straight merchandise commission continual pressure was brought to bear on department heads to O.K. larger trade-in allowances. Under a straight merchandise commission there is a tendency on the part of salesmen to feel that the merchandise they are handling is priced too high. Experience with the gross-profit commission has brought out the fact that salesmen now urge the company to maintain proper selling prices, arguing that good salesmanship can overcome low-priced competition.

Payment of revenue or load-building commissions, based on value of the equipment sold, from both revenue-building and load-factor standpoints, is highly important, judging from experience and observations. A careful analysis was made of the revenue-producing value of each appliance or piece of equipment, as well as its load characteristics. It was ascertained in the domestic field that the replacement of a manually operated tank water heater by an automatic storage heater occasioned an average yearly increased consumption of 29,000 cu.ft. of manufactured gas, the greater part coming on the valley of the annual load curve.

Analyses were also made of revenue value and load characteristics of many other appliances. Revenue commissions were then set up which caused the selling of a much greater percentage of large revenue-producing and off-peak consumption equipment.

Obviously, sales representatives will put forth much greater effort to sell revenue-producing appliances when the reward for such sales is greater. The more desirable the business secured, the more liberal is the commission.

Results of the aggressive sales methods inspired by the revised salesmen's compensation schedule show in the summary of orders executed during eleven months of 1929: 4,710 all-gas house-heating orders; 2,145 domestic automatic storage heaters and 765 domestic auxiliary room heaters. During the same period 80,000,000 cu.ft. of natural gas was added to the annual load, while the industrial gas load increased 1,500,000,000 cu.ft.—all at an increasingly lowered selling expense.

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Rubber Specialties Cut by Electric Heat

By MYRICK CRANE

Development Engineer Seamless Rubber Company, New Haven, Conn.

ELECTRICALLY heated devices have found useful application in the cutting or shaping of rubber sheet into strips or such irregular forms as segments of bladders for association standard footballs. In the case of strips it has been found possible to cut thin sheets stacked to a thickness of about 2 in. by means of a tool adapted from a 500-watt soldering iron. The copper tip is replaced by a bronze blade which has high heat conductivity and can be drawn through the thick rubber rapidly, leaving smooth edges and no fusing along the cut. The football bladders are being cut successfully by means of a hand cutter similar to a cookie cutter, the cutting edge consisting of a nichrome ribbon on edge. The ribbon is heated to the requisite temperature by current from a low-voltage transformer. The nichrome is supported in a metal frame and insulated from it by mica sheet inserts.

On the other hand, wide sheets with fabric backing, like adhesive tape, are slit by knives into narrow strips and wound on rolls. A certain amount of unevenness in the wide roll as it feeds into the slitter is inevitable; this formerly resulted in the discarding of an appreciable amount of material along the edges of the sheet. The installation of a device made by the Blake Electrical Manufacturing Company accomplished the elimination of much of this waste, an extra reel of narrow tape being obtained from the slitting machine. This device employs a finger responsive to the variation in location of the edge of the 36-in. sheet as it travels. The shift in position of the finger actuates a relay which starts and stops a small d.c. motor, which in turn shifts the position of the large roll on the arbor to compensate for the wavy edge. The

roll is therefore fed toward the slitting knives with less variation in the approach of the edges.

Devices have been tried in conjunction with the control of thickness of rubber sheet and adhesive tape. One employed two electrostatic plates, above and below the sheet, a bridge circuit being connected to these plates with the purpose of detecting variations in thickness by variation of the electrostatic capacity between them. It has not been wholly successful, however, not so much because of lack of uniformity in the dielectric properties of the sheet passing between the plates as because of the sensitiveness of external influences; the motion of the operator and parts of the machine in the immediate vicinity of the detection device resulted in spurious capacity readings. There is a call for a satisfactory device for this purpose.

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Adapting Radio Parts to Automatic Substations

By A. B. HARRITT

Maintenance Engineer
Des Moines Electric Light Company, Des Moines, Iowa

AS WE all know, the battery-and-eliminator-operated radio set is fast being replaced by the alternating-current set. This fact causes the economists no little worry, and "What to do with out-of-date radio equipment" is a vexatious question. To do its bit the Des Moines Electric Light Company has devised a scheme whereby the control relay of the bygone radio can be utilized.

We have on our system an automatic feeder reclosing and supply selecting substation that is battery operated. In parallel with the battery is a motor-generator set regulated to carry the load of the pilot lamps on the switchboards and give the battery a constant trickle charge. We have had a brush stick in the generator and stop charge, or a fuse has blown because of a surge on the line and left the battery to carry the load. Under these conditions the battery discharged to a poor operating condition before the trouble was discovered.

It has been stated that necessity is the mother of invention. We needed some sort of signal device. The control relay on the old radio "A" and "B" power suggested itself. It is a series relay, will carry 5 amp. continuously without heating and it has contacts that close when the coil is de-energized. What more could be desired? We connected the relay coil in series with the lead from the generator and the contacts of the relay, that are open when the coil is energized, to the receiver switch contacts of the telephone that connected with the board at the dispatcher's office.

Now when the motor-generator set stops charging for any reason the relay contacts close and the signal on the telephone switchboard lights up. The operator can get no answer and he knows that something has stopped the battery generator at the station or some one has raised the telephone receiver and then fainted. A maintenance man is called and sent to the station. The relay is so connected that conversation over the line is in no way obstructed whether the contacts are open or closed. The light on the board through this relay scheme also indicates each time the station preferred line fails and load is transferred to the emergency line because there is a short interruption and the motor-generator drops out. The signal light on the board lights for a few seconds and then goes out.

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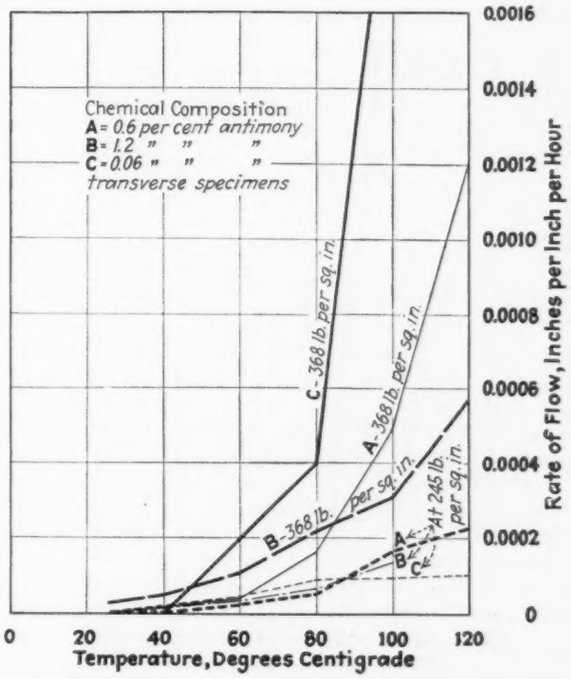
Antimony Content Increases Lead Cable Creepage

THE creepage of lead cable is proportional to the antimony content of the lead of which it is composed, according to a paper, "Flow Characteristics of Some Lead Cable Sheath at Temperatures Above Atmospheric," presented by C. L. Clark and C. Upthegrove before the semi-annual A.S.M.E. meeting in Detroit.

The authors report upon the results of an investigation on three types of lead cable sheath differing only in the antimony content, which was, respectively, 0.06, 0.6 and 1.2 per cent.



How antimony affects the rate of creepage of lead

It was found that increasing the antimony content does not decrease the rate of flow at lower temperature; instead, it lowers the resistance to creepage. At a temperature of 176 to 246 deg. F. the higher antimony content results in a comparatively high rate of creepage. At room temperature all three compositions of lead cable sheath elongated at more or less fixed rates with loads as low as 245 lb. per square inch. The results would indicate that a similar behavior would be obtained with still lower loads, and that the behavior of lead at 70 deg. F. should be similar to that of plain carbon steel at a temperature above its equicohesive range.

More Outlets for Chicago

An interview with

E. W. LLOYD

Vice-President Commonwealth Edison Company

EFFORTS that have been made and are still being made to increase the number of outlets in domestic installations in Chicago have attracted national attention. Some rather inflated figures regarding number of outlets sold and business handed over to contractors have been rumored about in the industry in connection with the Chicago campaign. Results have been obtained, but they are more modest than the exaggerated reports would indicate.

THE Chicago activity, which has been going on now for about a year, was planned originally to be a component part of a proposed national campaign which was then in discussion. The national campaign, however, did not materialize and Chicago, which had taken up the idea with much enthusiasm, decided to go ahead on its own. In order to get a true picture of the situation "Electrical World" interviewed E. W. Lloyd, vice-president of the Commonwealth Edison Company, who is in charge of the Chicago activities.

"LAST April there began in the Chicago daily papers a series of advertisements on the convenience and necessity of adequate electrical outlets in the home," said Mr. Lloyd. This statement was in response to a question as to what results had been attained in the Chicago campaign so far. Mr. Lloyd continued: "The Commonwealth Edison Company appropriated $100,000 for advertising to supplement the direct selling, which, although in a measure successful, had been found to be an expensive activity standing by itself. An appropriation of $100,000 had been originally allowed for the selling campaign. After nine months of effort we found it to be a slow and difficult process. The direct-sales effort is made on the basis of installing three outlets for $17.25, two for $12 and one for $8. The salesmen attempted to sell no less than three outlets, as no smaller job would justify the low unit price of $5.75. Contracts for more than three were taken at this unit rate. The contracts when obtained by the utility salesmen are turned over to a committee of the Electrical Contractors' Association, whose members do the work. The contractor gets his money from the Commonwealth Edison Company as soon as his job is finished and then the utility bills the customer on monthly installments added to his electricity bill until the job is paid for.

"In the nine months previous to the beginning of the advertising our salesmen took contracts for a total of 21,000 outlets. This number does not represent the whole number of outlets added. We have found it a frequent occurrence that a prospect, although refusing to give the contract to the salesman, would nevertheless have the work done by a neighborhood contractor to whom he wanted to give the business. So far as our purpose was concerned, this was perfectly satisfactory, but it was a little hard on the salesman, whose commissions suffered in this way. From information gained by call-backs to customers who apparently were sold but did not order during the first interview, it is apparent that a number of outlets at least equal to the orders

taken by our salesmen were so installed. It is principally a recognition of this fact that has influenced us to turn to the more general selling appeal of newspaper advertising.

"The $100,000 that has been appropriated for advertising will be spent by the end of this year unless it is demonstrated by next September that the effort has not achieved the results expected from it. At that time the whole situation will be analyzed in order to learn what effect the advertising has had and to determine whether or not that effect is sufficient to make its continuance worth while. If it appears that the direct-selling efforts have not been considerably assisted by the advertising it will probably be discontinued.

"The advertising copy has been carefully prepared and the efforts of the sales force are being co-ordinated with it. In addition, we are circularizing customers with direct-mail pieces that fit in with the newspaper campaign. The newspaper copy is very general in character. While prices are quoted in it, they are not made the principal appeal. The idea is to encourage electrical contractors to make use of this advertising to assist them in their own business-getting efforts.

"We are not trying to secure all of the wiring contracts ourselves, but we would like to have every contractor in the city participate in the movement. Of course, it is only to those contractors who are recommended to us by the Electrical Contractors' Association that we will give collection and billing service, but we have no feeling at all about any other contractors doing the work. What we want is to get the job done. The quotations of our salesmen are based on the use of 'Romex' wire, which has been approved by the city authorities, and so far its use has apparently been successful."

Effect of added outlets on consumption

The question as to whether the increase in outlets already achieved had had any apparent effect on domestice consumption was put to Mr. Lloyd. He replied:

"The inadequacy of wiring in the homes of Chicago is well known to us, just as the same condition in other cities is well known to the utilities that serve them. The Commonwealth Edison Company has more than a million customer meters and eight-tenths of them are domestic. In 1929 we sold an average of 629 kw.-hr. per residential customer. This figure is high, considering the fact that it includes no electrical cooking. I point out these considerations of number of customers and average consumption because, without taking them into account, my answer of 'no' to your question would appear as a negation of the value of our outlet sales activities. If we had fewer domestic customers and their average use of electricity was much less the effect might be apparent.

"We could, no doubt, keep a record of customers to whom our men had sold outlets, observe their billings for a period and thus arrive at some conclusion as to the increased consumption attributable to these sales. But the obtaining of such a record would be a tremendous bookkeeping job, one that would be an obstruction in the customer accounts routine. And if we did collect such data, think how many qualifications there are to vitiate its value as conclusive evidence. One of our men makes a sale but gets no contract; the job goes to the neighborhood wireman who has a shop around the corner. Or our man gets the contract and it is handed over to a member of the association. The wireman, if he is a smart lad—and some wiremen are smart lads—shows the housewife how easy it is to stick in a few more boxes while he is on the job. And, while in not such large numbers as we should like to see, there are homes in Chicago that are being rewired and in which outlets are being added wholly independent of our efforts. The list of customers to whom we sold outlets would not include all who had added them. Thus the data to be obtained by keeping such a record would be of questionable worth, to say the least."

"Well, then," said the interviewer, "how would you sum up the situation?"

"It can be done in few words," answered Mr. Lloyd. "We started the job after its proposal as a national activity had turned out to be only a flash in the pan. We have already spent about $100,000 on it and we are preparing to spend $100,000 more if it is necessary. Candidly speaking, we are not yet able to say whether or not the effort and expense are worth while. We hope to find out by September or by January next. We are reasonably certain that direct selling unsupported by advertising does not produce sufficient result. What effect the advertising will have remains to be seen."

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ELECTRICAL CHARACTERISTICS OF CEMENT PLANTS

Taken from a recent report of the Commercial Section of the Southwestern Division, N.E.L.A.

Plant	A	B	C	D	E	F	G	H
Process	Wet	Dry	Wet	Wet	Wet	Dry	Wet	Wet
Plant capacity, barrels per day	4,200	2,500	4,000	2,200	3,200	4,000	1,650	1,825
Number of kilns	3	2	2	2	3	2	1	1
Sizes	.....	10x150 ft.	.....	10x150 ft.	.....	....	....	....
Source of power	Purchased	Purchased	Purchased	Purchased	Purchased	Private plant	Purchased	....
Horsepower connected	7,400	5,800	5,118	4,000	5,800	....	....	....
Kilowatt demand, maximum	4,416	3,000	2,779	2,400	3,000	4,200	1,204	1,320
Kilowatt demand, minimum	4,072	2,400	2,013	1,900	.....	....	....	....
Kilowatt demand, average	4,277	2,800	2,315	2,130	.....	....	....	....
Barrels per day output, maximum	4,293	2,500	4,000	2,350	3,200	4,000	1,650	1,825
Barrels per day output, minimum	3,879	2,200	.....	2,000	.....	....	....	....
Barrels per day output, average	4,085	2,400	.....	2,200	.....	....	....	....
Kilowatt-hours per month per barrel	23	23.8	14.2	21.8	13.6	16.2	13	13
Maximum kilowatt-hours per day	96,000	60,000	58,000	48,000	.....	....	....	....
Minimum kilowatt-hours per day	35,950	.....	40,000	22,000	.....	....	....	....
Average kilowatt-hours per day	75,439	39,900	45,000	37,500	.....	....	....	....
Monthly load factor, per cent	.....	.....	.....	.....	63	65.5	75	75
Annual load factor, per cent	.....	.....	.....	.....	62	63	75	....
Power factor, per cent	.....	.....	.....	.....	70–80	87	1.00	1.00

BOOK REVIEWS

The "Electrician" Annual Tables of Electricity Undertakings, 1930

London: Ernest Benn, Ltd. 224 pages. Price, 10s.

This excellent publication is so well known to those who have occasion to look up information regarding foreign electric light and power establishments that a mere mention of the appearance of a new edition is sufficient. This, the 43d, is stated to contain particulars regarding 800 British and 1,300 Dominion, Colonial, American and foreign undertakings of all kinds. A new feature is the incorporation of a section giving details on British electric railways, which are now of considerable importance and will undoubtedly be extended in the near future.

Regarding British and Colonial undertakings, this publication has long been the recognized authority; it contains for each city statistics regarding plant, voltage, number of consumers, rates per kilowatt-hour and often other statistical information. Regarding non-British undertakings the information is necessarily more fragmentary, but even here, much is given that is not readily obtainable otherwise.

In view of these excellences the choice of the information regarding American operations is unfortunate. We have, it is true, so many companies that the inclusion of all of them in a British publication is out of the question. Any one wanting more details would naturally turn to reference works published here. But it is puzzling to imagine what criterion led to the inclusion of Far Rockaway, N. Y.; Rockingham, N. C. (astoundingly credited with 387,000 population), but to the exclusion of Boston and San Francisco (California is credited, as though it were a town, to the Pacific Gas & Electric Company), while Portland, Me., is in, but Portland, Ore., is out. This part, in the section devoted to foreign undertakings, should be thoroughly revised; the prospective American user is likely to judge the work by the parts that come within the scope of his own knowledge, whereas the book as a whole is immeasurably better than one would suspect from its information on the United States.

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Taschenbuch der drahtlosen Telegraphie und Telephonie

By F. Banneitz. Berlin: Julius Springer. 1,253 pages, 1,190 illustrations, 131 tables. Price, 64.50 reichsmarks.

According to a plan familiar to the users of "handbooks" dealing with various older branches of engineering, the preparation of each of the six sections comprising this volume has been intrusted to one or several specialists. The first part contains fundamentals beginning with appropriate mathematical tables and formulas, taking into account both the electrical and the geographical aspects of the subject. Following this are chapters relating to physics, electrical circuits and machinery and communication engineering. This section constitutes a seventh of the whole volume. The balance is devoted more directly to the theory, principles and devices of radio telegraphy and telephony, conveniently arranged for reference; many facts and data of a practical nature are included, e.g., characteristics, wave lengths and call letters of important stations engaged in international transmission. Numerous references to non-German sources reflect breadth of selection of material. A novel and useful feature, supplementing the outspeeded dictionaries, is the inclusion of glossaries giving German equivalents of English and French terms. The index is full; over 30 pages, perhaps 5,000 items.

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Modern Physics: A General Survey of Its Principles

By Theodor Wulf (translated by C. J. Smith). New York: E. P. Dutton & Company, Inc. 464 pages, illustrated.

Practicing engineers are often heard to express the wish that they might find one ready access to the modernities of physics, created by subatomic research since they were students in physics. Professor Smith of Royal Holloway College has translated Wulf's German effort to present the realignment of physical thinking in facile fashion for the busy engineer who asks merely an authoritative sketch and not an academically rigid treatise. Long derivations are omitted and mathematical formulation is restricted to interpretive employment. Four sections deal consecutively with molar physics, the atomic foundations of matter, the phenomena associated with electronics and atomic structure, and physics of the ether.

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Mathematisches Praktikum

By Dr. Horst von Sanden. Leipzig and Berlin: B. G. Teubner. 122 pages, 17 diagrams.

Most American teachers of mathematics to undergraduates take the solution of problems by the students for granted as an essential part of the course. The inefficient lecture method, a bewilderment to the slow-minded and bore to the quick, is probably the exception rather than the rule, retained under pressure of the demands of mass production, though not always admittedly so. In this country, therefore, the author's remarks to justify publishing a book of practical problems as an adjunct to a lecture course on the calculus will seem unnecessary.

The problems are well chosen and varied. They include solutions by successive approximation, estimates of probable error, finding complex roots of a fourth degree function, smoothing an empirical function, graphic integration, tabulated harmonic analysis and other topics. In general, the solutions are completely worked out, attention being particularly called to expeditious, as against awkward, methods of doing the numerical work. The book should interest mathematics teachers and engineering educators generally. It would have been a distinct addition, however, and in line with sound pedagogical practice, if more material were included for solution by the student. Lectures alone do not develop independent skill, as the author points out. Neither does the study of solved problems, though it helps. We learn to do by doing.

Men of the Industry

A. B. SANBORN, general manager of the East Kootenay Power Company, Ltd., Fernie, B. C., has been elected a member of the board of directors of that company.

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HAROLD S. FALK, vice-president and works manager of the Falk Corporation, Milwaukee, has been made the recipient of the honorary degree of master of science by Marquette University in recognition of the work done by him in the promotion of the apprentice training movement in American industries.

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JUDSON BIBB, recently connected with the Mountain States Power Company, Albany, Ore., has resigned to become manager at Winnemucca, Nev., of the Western States Utilities Company. He succeeds O. R. MATHIAS, who has joined the Nevada Valleys Power Company, recently acquired by the Sierra Pacific Power Company, Reno, Nev., to manage the Lovelock, Nev., property.

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AMBROSE B. MCKENNA, commercial engineering staff, Westinghouse Lamp Company, is making a special study of the business applications of ultra-violet light in European countries, particularly Germany and France. His investigations are covering, primarily, the field of general lighting and the results obtained from the use of mild ultra-violet sources in buildings and basements, tunnels, mines and all such properties from which sunlight is normally excluded.

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JUDSON F. STONE of Chicago has been named president of the Bates Expanded Steel Corporation, East Chicago, Ind., recently organized to succeed the Bates Expanded Steel Truss Company, as announced in "Business News and Markets" in this issue. Mr. Stone will give particular attention to the development of the corporation's policies. ALBERT J. BATES, JR., has been named vice-president and general manager. Mr. Bates, Jr., has been closely identified with all of the operations of the company since 1917, having had to do with numerous of the company's inventions and the development of special machinery, both in the American and Italian works. During recent years he has been active in sales and in the management of the business. He succeeds his father, who has recently retired. Emery F. Holt, who some time ago sold "Bates Expanded" products for a period of eight years, has been appointed assistant sales manager.

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A. Emory Wishon Extends Activities on Coast

THE RECENT ALLIANCE OF THE San Joaquin Light & Power Corporation and the Midland Counties Public Service Corporation with the Pacific Gas & Electric Company has brought to the foreground A. Emory Wishon, who was elected president of the two first named companies and vice-president and

assistant general manager of the last named company. Not by any means that Mr. Wishon has been an unknown quantity in Pacific Coast electrical circles, as he has spent his entire business career in the electrical industry in California, having started in it as a boy with his father, who was a pioneer in electrical development in the San Joaquin Valley. He worked in different operating capacities before entering the Missouri School of Mines, from which he was graduated in 1908. After obtaining this technical education he returned to California to devote his time to the enterprises which his father had undertaken.

From 1908 to 1910 Mr. Wishon served as manager of the Coalinga Water & Electric Company and from 1910 to 1920 as assistant general manager of the San Joaquin Light & Power Corporation, later becoming vice-president and general manager of the San Joaquin company. In 1927, after the North American Company had acquired control, he was transferred from Fresno to San Francisco, where he assumed the additional duties of vice-president and general manager of the Great Western Power Company. Mr. Wishon has been active in association and civic affairs, being a past-president of the Pacific Coast Electrical Association and having served for two years as chairman of the National Electric Light Association committee on customer ownership. He has also been interested in civic affairs, and for many years has been a director of the California State Chamber of Commerce and also a director of the San Francisco Chamber of Commerce.

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J. C. PATTERSON has been appointed electrical engineer in the power department of the eastern division of the Virginia Public Service Company, to fill the vacancy occasioned by the promotion of George E. Kidd to assistant division manager. Mr. Patterson was formerly connected with the General Electric Company and with the Appalachian Electric Power Company.

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J. M. HARLEY, formerly assistant to the superintendent of power plant of the Dallas Power & Light Company, Dallas, Tex., has been promoted to the position of superintendent of power plant. F. H. ELMORE, JR., was promoted from division head in charge of the electrical division to assistant superintendent of power plant.

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FRANCIS J. BRETT, for a number of years treasurer of the Buffalo, Niagara & Eastern Power Corporation, has been elected comptroller of the Niagara Hudson Power Corporation. Mr. Brett started with the Niagara Falls Power Company in 1908, but in 1917 he joined the Tonawanda Power Company. Shortly after this connection he returned to the Niagara Falls Power Company as chief accountant for that company and subsidiaries, and in 1921 the board of directors elected him to the office of assistant treasurer. When the Buffalo, Niagara & Eastern Power Corporation was organized, in 1925, he was made assistant treasurer and two years later

he was elected to the office of treasurer. Last fall he was also elected assistant treasurer of Niagara Hudson Power Corporation, the position which he held until his most recent advance, when he became comptroller.

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J. H. ESTABROOKS has been appointed electrical superintendent of the Glens Falls division of the New York Power & Light Corporation and in this capacity will have charge of all electrical maintenance work, line construction and other electrical operations in the division. He was formerly connected with the Cohoes and Albany offices of the company.

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CARL H. MORKEN, formerly plant metallurgist with the Ohio Brass Company, Mansfield, Ohio, has recently resigned to become foundry engineer of the Detroit Electric Furnace Company of Detroit, Mich. Mr. Morken, who is a graduate of the University of Minnesota, with years of practical experience in foundry operation, will be connected with the sales and service division of the Detroit Electric Furnace Company.

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EDWIN J. PRINDLE, chairman of the patents committee of the American Engineering Council and leader of movements which resulted in the reform of the U. S. Patent Office, has been made the recipient of the honorary degree of doctor of laws by National University, Washington, D. C. The problem of governmental protection of inventive enterprise has engaged Mr. Prindle's attention since his graduation from Lehigh University in 1890.

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W. O. CONWAY, formerly director of education for the American Arbitration Association, joined the headquarters staff of the National Electrical Manufacturers' Association to assist in carrying on the increasing staff duties required by the expansion of the association's activities. Mr. Conway has had extensive experience in handling publicity and promotional work for associations, institutions, business organizations and individuals.

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EDWARD B. NEWILL, widely known electrical and mechanical engineer, has been appointed vice-president of Frigidaire Corporation in charge of engineering. Following graduation from the Georgia School of Technology he joined the Westinghouse organization. He served as railway engineer in the direct-current motor section, later as industrial engineer in the automobile equipment section and subsequent promotions brought him to the position of manager of control engineering. Mr. Newill joined the General Motors Radio Corporation last October.

D. W. Hayes Heads Michigan Association

D. W. HAYES, district agent of the Detroit Edison Company at Port Huron, was chosen president of the Michigan Electric Light Association at the business session of the 1930 convention of that organization at the Grand Hotel, Mackinac Island. The new president of the electric light association is a Michigan man, having been born at Bay City. He was graduated from the University

of Michigan in the electrical engineering department of the college of engineering. Mr. Hayes was for a time with the General Electric Company at Schenectady, N. Y. He joined the Detroit Edison Company in 1913, being first stationed at Ann Arbor and later going to Port Huron. He has been with that company ever since, except for two years spent in military service.

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CHARLES EDWARD BROWN, JR., for the past five years manager of the power and light department of the Chicago branch of the Okonite Company, has been appointed assistant to the general manager of that company with headquarters at New York. Albridge H. McNeill has been appointed to succeed Mr. Brown. He has had extensive experience in the selling and servicing of insulated cables.

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H. C. GOODRICH, chief engineer of the Utah Copper Company, was recently elected president of the Utah Society of Engineers. Mr. Goodrich has been prominently identified with the engineering profession in Utah for many years. Twenty-two years ago he took charge of the engineering work for the Utah Copper Company at its mine in Bingham Canyon, Utah, and for the past twenty years has been chief engineer for that company, with headquarters at its general offices in Salt Lake City.

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JOSEPH P. MACSWEENEY, manager of the domestic sales department of the Rochester Gas & Electric Corporation, has been appointed supervisor of merchandising operations of the Associated Gas & Electric Company with headquarters in Rochester. Mr. MacSweeney has been connected with the Rochester utility for 41 years.

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WALTER C. PEARCE, sales manager of the Syracuse Lighting Company, has been named by Stefaan Piek, vice-president of the Niagara Hudson Power Corporation, director of the industrial sales of gas and electricity in the central division. Mr. Pearce joined the Syracuse Lighting Company in 1911. He was previously connected with the Beacon Electric Company of Troy, N. Y., and the Cortland County Traction Company.

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FREDERICK W. FISHER, formerly director of public relations of the Rochester Gas & Electric Corporation, has been named manager of personnel and public relations of the Associated System. Rochester will continue to be Mr. Fisher's headquarters and he will personally supervise the public relations department of the local office in addition to co-ordinating employment and interchange of employees from one property of the Associated to the other. Mr. Fisher is a Cornell graduate in civil engineering and removed to Rochester in 1909 as field engineer. ORMOND TITUS, purchasing agent of the corporation since 1927, has been appointed general manager of the western division, New York State Electric and Gas Association, with headquarters in Lancaster.

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OBITUARY

GEN. IRVING HALE, founder of the Veterans of Foreign Wars, died July 27 in Denver, Colo., after an illness of several days. He was a first lieutenant of engineers when he resigned from the regular army in 1890 to become manager for the General Electric Company in Denver. In 1900 he and a handful of other veterans met in the Colorado State House and organized the Veterans of Foreign Wars. The State University conferred on him a LL. D. degree and the Colorado School of Mines awarded him the honorary degree of electrical engineer. General Hale was 68 years of age.

Financial and Statistical News

GAINS by the utility stocks to the end of July were fairly well sustained. American Gas & Electric led the move with about 30 points advance in ten days. This is attributed in the Street to merger rumors or accumulation by Electric Bond & Share. Brokerage letters this week generally anticipate higher market prices in August.

——BUYING OF HIGH-GRADE BONDS starts to show a definite increase. New issues are readily absorbed, although the volume to date this year is about 30 per cent over last year's totals for the same period.

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June Operations Again Show Gains

ABOUT 2.5 PER CENT INCREASE in revenue for June of this year compared with 1929 is shown by a preliminary analysis of returns thus far received by the ELECTRICAL WORLD from light and power companies. If this rate of gain is confirmed by reports yet to be received it will indicate a rise of $4,100,000 over the revenue of $165,300,000 for June, 1929, and $17,100,000, or 12 per cent, compared with June, 1928. Energy sales by the same companies also increased but at a somewhat smaller rate —not quite 2 per cent.

According to these figures June operations of the power industry continued at virtually the same level as that of May, taking into account the usual slight seasonal decrease to be expected at this time of the year. As in recent months the major gains are found in the residential load rather than in industrial power sales.

The general average was exceeded in the groups of states on the Atlantic Seaboard and, by a wider margin, in the South Central States. The Southwest gives indications of an ultimate resumption of the remarkable pace interrupted some months ago by a period of slower growth. In the North Central States operations continue below last year's level. Other regions show little change.

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Britain Increases Use of Electrical Energy

OFFICIAL RETURNS SENT TO THE British Electricity Commissioners show that 818,000,000 kw.-hr. was generated by authorized undertakers in Great Britain during May, compared with 753,000,000 kw.-hr. in the corresponding month of last year, an increase of 8.6 per cent. During the first five months of 1930 the amount of electricity generated by authorized undertakers was 4,672,000,000 kw.-hr., compared with 4,404,600,000 kw.-hr. for the corresponding period of 1929, an increase of just over 6 per cent.

This showing compares favorably with that of the same industry in the United States, where the average rate of gain for the same five-month period was about 2.5 per cent, but British manufacturing activity reached no such heights as ours in 1929, with the correspondingly expanded energy consumption.

Portland Utility Forms Two Subsidiaries

TO FACILITATE COMPLIANCE with the recent order of the Oregon Public Service Commission that the power business and street railway business of the Pacific Northwest Public Service Company, Portland, be kept entirely separate, the company proposes to form two subsidiaries for administrative purposes. Under the plan proposed the Portland General Electric Company will be formed to take over the physical property and franchises covering the power and light and interurban railway operations and the Portland Traction Company to take the street railway property and franchises.

In order to effect a transfer of the franchises to these new companies, consent of the City Council through ordinance is necessary, and consideration of the proposition has been asked of the Council. It is proposed to organize the new companies entirely through a stock issue, of which the parent Pacific Northwest Public Service Company will become the sole owner.

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Simpler Capital Structure for Midland United

FURTHER simplification of the capital structure of the Midland United Company, a utility holding company in the Insull group, is planned. It has been announced that an offer will shortly be made to stockholders of American Public Utilities Company, a subsidiary of Midland United, asking them to exchange their holdings for stock of the parent company. The American Public Utilities Company, which serves as an intermediary holding company, would thus be eliminated as a separate entity. Preferred-stock holders will be offered alternative exchange proposals.

Under the plan, stockholders who exchange their securities will receive stock which at current market prices will have a value slightly above the call price for the issues traded in. Those who elect to take only common stock will receive a marginal advantage from the standpoint of current market prices. The basis of exchange follows:

Each share of the participating prefered stock of the American Public Utilities Company may be exchanged for 1.5 shares of the convertible preferred stock, series A, and 1.4 shares of the common stock of the Midland United Company, or the alternative of four shares of the common of the Midland United Company.

Each share of the prior preferred stock of the American Public Utilities Company may be exchanged for 1.5 shares of the convertible preferred stock, series A, and 1.6 shares of the common, or the alternative of 4.2 shares of the common of the Midland United Company.

Each share of the common stock of the American Public Utilities Company may be exchanged for 4.5 shares of the common stock of Midland United.

Massachusetts Adds Utility Securities to Legal List

THE STATE BANK COMMISSIONER of Massachusetts has added the following public utility securities to the list of legal investments for savings banks in that state:

Bangor Hydro-Electric first lien and refunding mortgage 5s, 1955; first lien and refunding mortgage 5½s, 1949. Central Maine Power first and general mortgage (series E) 4½s, 1957. Central Vermont Public Service first and refunding mortgage 5s, 1959. Consumers Power first lien and unifying mortgage 4½s, 1958. Eastern New Jersey Power first mortgage 5s, 1949; first mortgage 5½s, 1949; first mortgage 6s, 1949. Green Mountain Power first mortgage 4s, 1948. Western New York Utilities first 5s, 1946. Massillon Electric & Gas first mortgage gold 5s, 1956. Richland Public Service first mortgage sinking fund gold 5s, 1937. Ohio Public Service first mortgage and refunding gold (series A) 7½s, 1946; first mortgage and refunding gold (series B) 7s, 1947; first mortgage and refunding gold (series C) 6s, 1953; first mortgage and refunding gold (series D) 5s, 1954. Potomac Electric Power consolidated mortgage 5s, 1936; general and refunding (series B) 6s, 1953. Southern California Edison refunding mortgage 5s, 1954.

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Decrease for June, Gain for Half Year

THE POWER OUTPUT of the electric subsidiaries of the American Water Works & Electric Company for the month of June totaled 148,871,496 kw.-hr., a decrease of 4 per cent over the output of 154,377,250 kw.-hr. for the corresponding month of 1929. For the six months ended June 30, 1930, power output totaled 959,441,208 kw.-hr., 2 per cent greater than the output of 945,134,476 kw.-hr. for the same period last year.

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Water Power Leads in Guatemala

GUATEMALA HAS 53 central electric light and power plants, according to Special Circular, No. 577, revised, recently published by the Electrical Equipment Division of the Bureau of Foreign and Domestic Commerce. In addition, eight places are served by transmission lines.

The largest plants are at San Luis, 5,000 kw.; Santa Maria, 4,000 kw., and Palin, 1,814 kw.; these are all operated by water power, as are most of the other plants in the country. Only a few use steam or Diesel engines. With a few exceptions, American rather than European practice governs the type of service offered—60 cycle, three phase, 110-220 volts.

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Recent Listings

BALTIMORE STOCK EXCHANGE has authorized the listing of 4,000 shares of additional no-par value $6 cumulative preferred stock of the American States Public Service Company. Listing of 800,000 shares of 5½ per cent first preferred stock of the Pacific Gas & Electric Company on the San Francisco Stock Exchange has been announced. The new listing has a total par value of $20,000,000.

Saxon Utility Offers $10,000,000 Loan

FIVE PER CENT GUARANTEED gold notes of the Saxon Public Works, Inc., were offered the investing public at 97½ and interest, yielding 6.35 per cent, a piece of financing involving a total of $10,000,000. These securities, dated July 15, 1930, will mature July 15, 1932. This system owns and operates one of the most extensive and modern electric light and power systems in Germany, serving an area of about 6,950 square miles and a total population of more than 5,000,000. The issue is guaranteed unconditionally by the Free State of Saxony.

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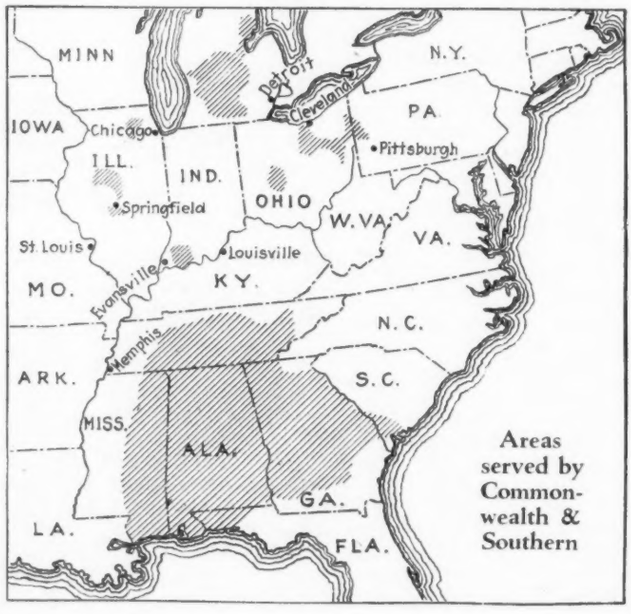
Commonwealth & Southern Inaugurates Merger Economies

WHAT the benefits of large-scale utility consolidation are should begin to appear in the operation of the Commonwealth & Southern Corporation. Only recently this billion-dollar utility giant completed its first year as a new corporate entity.

While the actual economies of operation naturally take a considerable period of time to become fully evident, some of the benefits undoubtedly have begun to appear. One of the first steps undertaken was a process of capital simplification in which many of the intermediary holding companies were eliminated. The top company was thus placed in immediate contact with the operating subsidiaries. The new enterprise was also strengthened by the addition of an engineering and construction concern. It is understood that a rigid program has been projected to increase operating efficiency and effect economies in many directions.



Intervention of a major business depression precludes direct comparison between the past year's earnings and indicated combined earnings of the individua companies. Gross earnings have increased only 2.6 per cent in the year ended June 30, and net earnings are up 2.9 per cent. Operating expenses advanced 2.1 per cent. Monthly earnings each month since March are actually below the figures for corresponding months of the previous year. The balance after preferred dividends was $23,507,621 this year. The earnings figures for this year and last were as follows:

Twelve Months Ended June 30	1930	1929
Gross earnings	$146,906,246	$143,241,446
Operating expenses	71,855,453	70,334,678
Net earnings	75,050,793	72,906,768

NEWS BRIEFS

West Penn Electric Company, which controls the electric subsidiaries of the American Water Works & Electric Company, Inc., reports power output to regular customers of 148,871,496 kw.-hr. for the month of June 1930, a decrease of 3.57 per cent under the output of 154,377,250 kw.-hr. for the month of June 1929. For the six months of 1930 power output to regular customers totaled 959,441,208 kw.-hr., which is greater by 1.51 per cent than the output for the corresponding period of 1929, which was 945,134,476 kw.-hr.

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Italo-Argentine Electric Company reports operating revenue of $1,639,410 for the three months ended March 31, 1930, an increase of $11,087, or 0.68 per cent, over the corresponding period of 1929. Net operating revenue totaled $998,593, an increase of $6,632, or 0.67 per cent.

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South Georgia Power Company (Commonwealth & Southern Corporation system) has called for redemption and payment on August 1, 1930, all of the Georgia-Alabama Power Company first refunding mortgage sinking fund gold bonds, series A, 6½ per cent, due February 1, 1957.

Commonwealth & Southern Corporation has offered to holders of 7 per cent preferred stock of the Ohio River Edison Company an exchange of their holdings for $6 series preferred stock of the Commonwealth & Southern Corporation at one 7 per cent share for one $6 series share plus $10 in cash. The 7 per cent preferred stock of the Ohio River Edison has been called for redemption in whole on October 1 at $110 a share and accrued dividends.

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Net profits of the Swiss-American Electric Company, which through its subsidiaries operates principally in South America, totaled $1,533,207 for the year ended April 30, 1930. Dividend requirements on the $6 preferred stock were earned over 2½ times.

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Public Utility Holding Corporation of America, organized last fall, has just issued its first report covering operations from September, 1929, through May 31, 1930, the end of the fiscal year. Gross income for the 8½ months amounted to $3,435,603 and net income carried to surplus, after all expenses and Federal taxes, totaled $2,939,955, equal to 87½ cents a share on the outstanding shares, or at the annual rate of $1.24 per share. Total assets amounted to $81,312,123.

Java Doubles Output in Four Years

ELECTRICAL DEVELOPMENT is going forward in remote parts of the earth at a pace even more rapid than in the United States. An illustration comes in a recently published report from the Dutch East Indies. The output of power plants in Java, Holland's important tropical island possession, more than doubled in four years, with the following yearly production:

	Kilowatt-Hours
1925	33,808,599
1926	52,823,034
1927	57,214,430
1928	61,660,441
1929	72,125,389

The unusual electrical growth in 1929, observed in other countries, is evident here, too, with an increase of 16 per cent for that year, compared with 1928. Sales constituted 93.7 per cent of the output; transformation and transmission losses, plus energy for intracompany use, consumed only 6.3 per cent.

Present installations aggregate 62,350 hp.; ultimate development of existing plants will increase this to 114,050 hp., all water power. Known sites aggregate more than 2,500,000 hp. The average annual energy consumption is only 2 kw.-hr. per capita, the population of the island being in excess of 36,000,000.

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NEW SECURITY ISSUES OF ELECTRIC SERVICE COMPANIES IN JULY

Name of Company	Amount	Period, (Years)	Class	Purpose	Interest Rate	Price	Per Cent Yield
Public Service Co. of No. Illinois..	$15,000,000	50	First lien and refunding mortgage bonds, series E	To reimburse the company in part for expenditures made in connection with the enlargement of the Waukegan station and to provide funds for extensions and additions to be made to the company's system.....	4½	94	4.82
Commonwealth Edison Co.....	12,000,000	30	First mortgage collateral gold bonds, series E.....	To reimburse the company in part for capital expenditures made in the development of its properties.....	4½	97½	4.65
East Coast Utilities Co.....	900,000	2	Convertible secured gold notes.....	.....	6	100	6
City of Seattle, Wash. (Municipal Light & Power Syst.)	2,500,000	11-30	Gold bonds.....	Construction and for extensions and betterments.....	4¾	.....	4.85
Wisconsin Power & Light Co.....	4,000,000	28	First lien and refunding mortgage gold bonds, series F.....	To reimburse for additional property acquired, for expenditures on additions and improvements and for other corporate purposes.....	5	99	5.06
Louisiana Power & Light Co.....	2,000,000	27	First mortgage gold bonds..	To provide funds to reimburse company for expenditures made for additions to property and for other corporate purposes.....	5	97	5.20
Consolidated Gas, Electric Light & Power Co. of Baltimore.....	7,500,000	40	First refunding mortgage sinking fund gold bonds, series H.....	To retire subsidiary and underlying securities	4½	98½	4.58
Oklahoma Gas & Electric Co.....	6,000,000	20	First mortgage gold bonds	To reimburse company in part for extensions and additions heretofore and now being made to its properties.....	5	99½	5.04
Pacific Power & Light Co.....	17,000,000	25	First mortgage and prior lien gold bonds.....	To retire maturing bonds, to reimburse company for expenditures made in connection with acquisition of properties.....	5	96	5.29
Tri-Utilities Corporation.....	5,000,000	21	Gold notes.....	To retire debentures and to acquire additional securities of subsidiaries.....	5	99½	5.25
Texas Electric Service Co.....	$33,730,000	30	First mortgage gold bonds...	To retire indebtedness incurred for the acquisition of properties now owned by the company and for other corporate purposes.....	5	97½	5.14
Pacific Gas & Electric Co.....	25,000,000	30	First and refunding mortgage gold bonds, series F.....	.....	4½	96½	4.72
Ohio Edison Co.....	18,834,500	30	First and consolidated mortgage gold bonds....	To provide funds for retiring securities of predecessor companies, for acquiring properties and for other corporate purposes.....	5	98	5.13
General Gas & Electric Co.....	50,000,000	1-5	Serial gold notes.....	.....	4½ and 5	99.50 to 95.75	5.02 to 6.00
Total.....	$199,464,500			Rights.....	.....	.....	
Total amount actually realized.	194,128,885			Total financing for July.....	$194,128,885		

Business News and Markets

Trade Improvement Impetus May Come From Abroad

AN ADVANCE in commodity prices is not a prerequisite to an upturn in business. Records of previous depressions show that commodity prices continued to go down for a period after the improvement began. As unfilled needs in the United States are relatively small, observers are looking farther afield for signs of definite business improvement. Some are of the opinion that this will become apparent first abroad; the wheat acreage in Argentina, for example, for the 1930-31 crop shows an increase. Under present conditions in that country it is known in advance that the crop will be produced at a very low cost. Even if world prices are low, the probabilities are that the Argentine grower will have a good margin of profit. Moreover, the cultivation and harvesting of so large a crop means large expenditures for labor and supplies.

With the possible exception of Brazil and Bolivia, conditions in all of the Latin American countries appear to be on the point of taking a turn for the better. Canada is another low-cost wheat-producing country where signs of business revival are seen. The Indian situation is more hopeful. Conditions in China certainly are no worse. The favorable position of cocoa promises prosperity for the Gold Coast, while other parts of Africa find themselves in a somewhat better situation. It is from these remote localities, rather than in the great industrial countries, that the revival of business is expected to make its more pronounced showing.

It is becoming more and more apparent that construction costs must come down if a program of the magnitude outlined at the President's conferences is to be carried through. Easy money is but one factor of cost. Labor costs still are at boom levels. A system of commission charges has grown up in the construction industry, which is held to be another element of cost which must be reduced unless the building program is restricted greatly.

This depression differs from that of 1921 in that a deferred building program simply was waiting for money to become cheap. The same was true with regard to railroad construction and throughout the entire field of equipment manufacture. Under present conditions there is no great dearth of building and few of the larger consumers are in a position where they have any pressing need to fill. One of the few large unfilled needs is that of electrification of railroads. If railroads could be induced to undertake large-scale electrification programs at this time it is believed that a maximum of public good would result, while the railroads probably would be able to do the work at lower costs than at any time in the near future, some believe.

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Lamp Industry Sponsors a Light Campaign

THE ADDITION OF AT LEAST one portable lamp to the lighting load of every wired home is the objective of the Add-a-Light campaign, an activity sponsored by many branches of the electrical industry. The Add-a-Light campaign will be presented in late October and early November. This time has been chosen due to the fact that, as the dark season is approaching, people are beginning to spend more time in their homes. Moreover, as the Christmas season immediately follows the close of the campaign, it is believed that this awakened interest on the part of the consumer will lead to an increase in the sale of portable lamps.

The campaign is a result of the realization of the manufacturers of portable lamps and "Mazda" lamps that they and others have an important common interest in any concerted effort which will induce consumers to buy and use more portable lamps. The interest of the central station is obvious when it is recalled that, on the average, the sale of one portable lamp means the addition

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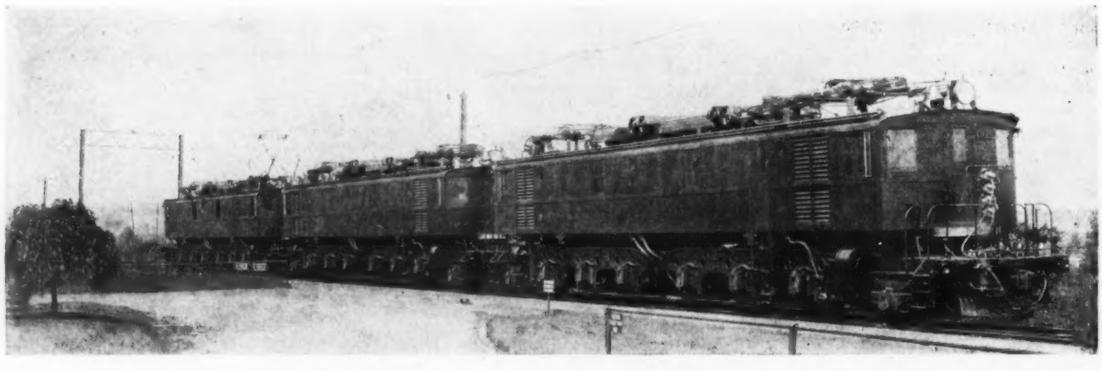
Great Northern Buys Three Locomotives



The above illustration shows three 260-ton motor-generator type single-phase electric locomotives being tested for regenerative electric braking on the test tracks of the General Electric Company at Erie, Pa., before shipment to the Great Northern Railway. Four of these locomotives, practically duplicates of the four General Electric units now in operation on the Cascade Tunnel electrification in Washington, are being shipped to the railroad.

of one and three-quarters active sockets to the central-station lines. The co-operation of the central stations entails no heavy expense, only co-ordination of normal merchandising facilities with those of others, particularly along the line of portable lamps.

The National Lamp Works and the Edison Lamp Works of General Electric Company are co-operating in the preparation of a series of four twelve-minute transcript broadcast programs.

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Automatic Arc Welding Sues A. O. Smith Corp.

CHARGING PATENT INFRINGEMENT in the use of certain electric welding apparatus and processes Automatic Arc Welding Company has entered suit against the A. O. Smith Corporation in the federal courts in Milwaukee. Plaintiff charges that defendant, a national factor in the production of welded transmission pipe, has used methods and processes patented by Harry D. Morton, secretary and treasurer of the Automatic Arc Welding Company, which patents are controlled by the plaintiff.

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Blaw-Knox Net Up 21 per Cent

NET PROFIT OF THE Blaw-Knox Company for the first half-year was $1,684,002 after all charges. This is equivalent to $1.27 per share of common stock and is a gain of 21 per cent over the total of $1,392,366 for the first half of last year.

Unfilled orders on the company's books as of July 1 were 23 per cent greater than at the same time last year and shipments for the first half-year showed a similar gain. It is understood that the improvement comes largely from products used in road building, subway and tunnel construction and transmission towers for public utilities. A continuation of very satisfactory business along these lines is indicated.

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Allis-Chalmers Net Up 8 per Cent

NET PROFITS OF THE Allis-Chalmers Manufacturing Company for the six months ended June 30 were $2,351,540, against $2,179,088 for the first half of 1929, a gain of approximately 8 per cent.

Unfilled orders on June 30, 1930, amounted to $17,833,860, comparing with $15,570,365 on March 31, 1930, and $15,657,566 on June 30 of previous year.

Bookings for the second quarter of 1930 were $14,819,533, as compared with $14,661,418 during first quarter of this year and $14,762,806 in second quarter of the previous year. Six months' bookings total $29,480,951, against $28,022,998 in first half of 1929.

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Bates Expanded Forms New Company

BATES EXPANDED STEEL CORPORATION, a recently organized corporation, with headquarters in East Chicago, Ind., has purchased the business of the Bates Expanded Steel Truss Company. New designs of parallel expanded poles have been developed and the corporation is actively enlarging the high-voltage transmission structural tower manufacturing division of its business. The corporation's facilities include a designing and engineering department, a large expanding and structural plant and a galvanizing plant and is now operating at good capacity.

Among the numerous orders in process is a large galvanized structural tower order from the Byllesby Engineering & Management Corporation for the Louisville Gas & Electric Company. Officers include Judson F. Stone, president and chairman of the board; Albert J. Bates, Jr., vice-president and general manager, and Emery F. Holt, assistant sales manager.

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TRADE BRIEFS

Ohio Brass Company has appointed M. M. Kenneally sales manager of the power utilities department with headquarters in Mansfield. He has been connected with the Ohio Brass organization for the past three years.

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Announcement has just been made that E. F. W. Salisbury, J. D. Webb and Max Rubenstein have resigned from the Standard Underground Cable Company, accessory department, to form the Cable Accessories Corporation of Pittsburgh, Pa. They will engage in the manufacture and sale of cable potheads, junction boxes, insulating compound, and miscellaneous jointing material.

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Aluminum Company of America has announced the opening of a branch office at 1031 South Broadway, Los Angeles, to serve southern California, Arizona and Utah. William C. Lynch, formerly affiliated with the company's San Francisco office, has been made manager of the Los Angeles branch.

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Master Electric Company, Dayton, Ohio, announces the discontinuance of the manufacture of its entire split-phase motor line in support of the enforcement of the recommendation of the joint committee on fractional-horsepower motors which became effective June 1.

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Westinghouse Electric Supply Company announces the appointment of Walter Williamson as commercial agent with headquarters at 150 Broadway, New York. Mr. Williamson was formerly Eastern district manager. W. J. Jockers, general sales manager of the company, on leave from the headquarters office, becomes acting district manager of the Eastern district with offices at 45 West 25th Street, New York.

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The Louis Allis Company, Milwaukee, announces the recent opening of sales offices in Pittsburgh with C. O. Sargent in charge; in Tulsa, Oklahoma, with W. Woobank in charge, and in Los Angeles with A. R. Thomas in charge.

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Timken Roller Bearing Earnings Down

NET EARNINGS OF THE Timken Roller Bearing Company for the first six months of this year amounted to $6,120,023, or $2.54 on each of the 2,413,967 shares. This represents a decrease under the net earnings for the similar period in 1929, when profits amounted to $8,449,198.

Outstanding shares of stock on June 30, 1930, were 2,412,967, so that the earnings for the first half of this year were equivalent to $2.54 a share, as compared with $3.51 at the same time last year, when there were 2,407,824 shares outstanding. Earnings for the second quarter, ended June 30, were reported at $3,013,364, equal to $1.25 a share, compared with $4,184,973, or $1.74 a share, in the same quarter last year.

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New York Metal Prices

	July 23, 1930 Cents per Pound	July 30, 1930 Cents per Pound
Copper, electrolytic....	11	11
Lead, Am. S. & R. price	5½	5½
Antimony.....	7	7⅛
Nickel, ingot.....	35	35
Zinc, spots.....	4.75	5.10
Tin, straits.....	29⅞	29⅞
Aluminum, 99 per cent.	23.30	23.30

Market Conditions

A DEFINITELY better tone is reported in equipment business in the Eastern district and a definite turn is anticipated within 30 or 60 days. Smaller electrical apparatus is moving satisfactorily in the Middle West and Southwest.

——PACIFIC COAST REPORTS MANY LARGE INDUSTRIAL PROJECTS and buildings in prospect. The outlook is exceedingly gratifying.

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MIDDLE WEST

—SEMI-ANNUAL REPORTS *of corporation earnings in the Middle West are more favorable than anticipated, while curtailment of production, together with a nearer stabilization of prices, has induced more general purchasing of commodities.*

—MAJOR ACTIVITIES, *steel, railroad, automotive and electrical industries, have improved their position somewhat. The utilities are proceeding conservatively, with more construction work scheduled for the balance of the year.*

Some of the interesting items placed this week include 1,000,000 lb. of ingot copper, 530,000 lb. of copper busbar, 350,000 lb. triple-braid, weatherproof wire and cable, construction of service structure to cost $700,000, twelve induced draft and twelve forced draft fans complete with appurtenances, four economizer and two reheat boiler arches complete with appurtenances, one automatic reciprocating coal sampler, and motor-generator sets to cost $50,000.

Jobbers' sales continue slow. Industrial activity is still somewhat spotty, although railroad business has improved. There has been a fair demand for most appliances with an exceedingly good demand for electric fans. Code wire prices were further reduced this week approximately 5 per cent.

CONSTRUCTION PROJECTS

Northern States Power Company, Eau Claire, Wis., plans underground conduit system at LaCrosse, Wis. Ford Motor Company, Dearborn, Mich., has approved plans for assembling plant at Richmond, Calif., to cost $3,500,000, including power plant. Inland Lime & Stone Company, Manistique, Mich., plans power substation to cost over $100,000. Perry Coal Company, Belleville, Ill., plans tipple and mechanical buildings to cost over $100,000. Car Service, Inc., Chicago, Ill., plans service, repair and garage building to cost $200,000. White Star Refining Company, Detroit, Mich., plans oil plant at Toledo, Ohio, to cost $250,000. Federal Machine & Welder Company, Warren, Ohio, plans additions to plant to cost $250,000. Ohio Power Company, Portsmouth, Ohio, plans power substation to cost $75,000. Purdue University, Lafayette, Ind., has asked bids for an addition to electrical engineering building to cost over $200,000. Roach-Appleton Manufacturing Company, Chicago, Ill., will build an electrical equipment manufacturing plant at South Bend, Ind., to cost $100,000. Pierre, S. D., will receive bids until August 8, for generators, Diesel engines, exciters, switchboards, etc., for municipal power plant. Iowa Public Service Company, Waterloo, Iowa, will build an addition to power plant at Charles City, Iowa, to cost over $60,000.

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SOUTHEAST

—JOBBERS OF ELECTRICAL MERCHANDISE *for resale report their business as being definitely on the upgrade in the Southeast, whereas volume in supply lines is reported as being about the same as has prevailed for the past 60 days. A Georgia jobber reports excellent progress for a washing machine campaign being conducted by one of the utilities, in which it is conservatively anticipated 325 such units will be sold.*

The recent heat wave promoted the sale of four carloads of fans for a Georgia jobbing house. A Georgia utility plans to start a sales campaign on electric ranges in early August and has arranged for the delivery of 1,000 ranges, and another utility company has arranged for delivery of 90 units for a similar campaign.

A Georgia supply dealer reports the sale of supplies and lighting fixtures for government hospitals at Richmond, Va., Lexington, Ky., and for a Post Office at Memphis, Tenn. The federal government building program has assisted materially through the recent depression in maintaining routine volume in the Southeast in the way of supplies.

Manufacturers' representatives dealing in copper products report business at its lowest point reached thus far and are unable to predict when any change in trend might be expected. A Georgia utility company purchased wire in the amount of $10,600 and miscellaneous supplies in the amount of $8,000.

CONSTRUCTION PROJECTS

Virginia Electric & Power Company, Richmond, Va., has filed plans for an equipment and distributing station to cost $150,000. Moundsville, W. Va., contemplates a municipal electric light and power plant. Liggett & Myers Tobacco Company, St. Louis, Mo., plans plant at Lexington, Ky., to cost $100,000. Tennessee Polytechnic Institute, Cookeville, Tenn., has plans for an industrial art building to cost $100,000. Memphis Power & Light Company, Memphis, Tenn., plans extensions in transmission and distributing lines, and substations, to cost over $500,000. Mountain Power Company, Chattanooga, Tenn., plans hydro-electric power development on Tellico River to cost over $1,000,000.

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PACIFIC COAST

—DETERMINED EFFORTS ARE BEING MADE *to stimulate general building activity by drawing attention to present remarkably low building costs. Prices have decreased, such staples as rubber-covered wire, flexible steel conduit, rigid iron conduit and boxes having dropped from 5 to 15 per cent during the past month.*

—WHOLESALERS REPORT THE QUIETEST *general business in several years. Industrial business, however, has improved and power company purchases are again good.*

Forthcoming industrial projects include a fire brick plant for Pittsburg, which in conjunction with a 613-acre Shell Oil plant at Martinez means that the northeastern San Francisco Bay area will become very active again, projects including the proposed 100-acre $6,000,000 Bethlehem Steel plant for Los Angeles, the Trumbull switch and panelboard plant in Oakland and a $500,000 factory office equipment plant in Los Angeles. Other major construction announced includes a $3,000,000 bond election for Berkeley schools, a $900,000 Los Angeles hotel, a $1,250,000 apartment building for San Francisco, a $650,000 Jewish community center building for San Francisco, a $1,000,000 hotel for Hollywood and a $2,000,000 addition to the Mills Building of San Francisco.

Another feature is the amount of remodeling and new construction in department stores in the San Francisco bay region, such as the new $2,000,000 I. Magnin Building in Oakland and a $500,000 Hales store in San Jose. Power company purchases include $75,000 worth of Westinghouse oil circuit breakers for San Francisco, two 150-kva. and two 196-kva. General Electric oil circuit breakers valued at $95,000 for Newark and ten General Electric locomotives for the city of San Francisco's Hetch Hetchy water plant construction, valued at $60,000, four carloads of 9-in. 55-ft. poles for Fresno, two carloads of bare copper wire and one carload of weatherproof wire for Fresno.

The Coast Range Steel Company Ltd., Vancouver, B. C., is reported planning a $23,000,000 steel plant, Weyerhaeuser Timber Company will build a 150-ton sulphite pulp mill in Longview this fall; a straw fiber process plant is planned for Salem, Ore., and St. Regis Paper Company of New York plans construction of a $250,000 paper conversion plant in Seattle.

CONSTRUCTION PROJECTS

Pasadena, Calif., will soon take bids for an addition to municipal electric light and power plant to cost $150,000, exclusive of equipment. Consolidated Steel Corporation, Los Angeles, Calif., plans plant to cost over $350,000. Pacific Gas & Electric Company, San Francisco, Calif., will make substation and line extensions at Stockton, Calif., to cost over $350,000. Richmond and Redwood City, Calif., plan ornamental lighting systems. Eugene, Ore., has approved bond issue of $450,000 for municipal steam-operated electric power plant. Tonasket, Wash., plans ornamental lighting system. Purchasing and Contracting Officer, Quartermaster Corps, Fort Francis E. Warren, Wyo., will receive bids until August 12, for switches, fuses and other electrical supplies (Circular 6). Salt Lake City, Utah, plans ornamental lighting system. Public Service Company of Colorado, Denver, Colo., will build addition to power plant at Boulder, Colo., to cost $100,000. Colorado Springs, Colo., plans ornamental lighting system. United States Militia Bureau, Phoenix, Ariz., will receive bids until August 9, for installing equipment in power plant, electrical distributing system, etc.

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EASTERN

—THE TURN OF AUGUST *shows a considerably improved market tone in the Eastern district and the general sentiment of leading manufacturers is that the valley period has been reached. This attitude is the natural reflection of the better volume of inquiries for electrical equipment that is now being evidenced, as well as a stronger flow of orders from industrial interests.*

—WHILE PROPHECIES MAY BE MEANINGLESS, *it is the consensus of opinion that a real turn in the situation will be indicated in the next 30 to 60 days.*

Wire and cable is in better demand, with railway account absorbing a good quantity of material. Power company business continues to trend to substation apparatus. Marine equipment shows excellent tendencies.

A metropolitan central station has given an order to a state manufacturer for transformers and accessory apparatus to cost about $75,000. A large hospital project at New York has recorded a $25,000 order for wire and cable with a local manufacturer.

A feature of the week in marine account is the order given by the Federal Shipbuilding Company, a subsidiary of the United States Steel Corporation, to the DeLaval Steam Turbine Company for five large turbine units, each of 10,000 hp. capacity and weighing about 350,000 lb. The contract totals $900,000 and will require about twelve months for completion. The turbine company will build an addition to its plant and advance production practically to normal.

A manufacturer of transformers in New Jersey reports substantial improvement in business, with commitments gaining each week for the past month. The plant is running at about 75 per cent of capacity and increased output is anticipated at an early date. Another maker of similar equipment in the Middle West says that while inquiries show improvement, active account still holds at a reduced level. A manufacturer of insulated wire states that the bulk of present business is hand-to-mouth buying, due, in part, to lack of stability in prices.

CONSTRUCTION PROJECTS

Borden's Farm Products Company, New York, will build a pasteurizing and bottling plant at Chicago, Ill., to cost $500,000. New York Central Railroad Company, New York, will build automobile service building to cost $1,500,000. Standard Oil Company of New Jersey, New York, will build a chemical plant at Linden, N. J., to cost $200,000. Wallace & Tiernan Company, Belleville, N. J., has filed plans for an addition to chlorine apparatus plant to cost over $150,000. Public Service Electric & Gas Company, Newark, N. J., will make extensions and improvements in switching station at Passaic, N. J. Taylor-Wharton Iron & Steel Company, Highbridge, N. J., will build additions to cost about $250,000. Jersey Central Power & Light Company, Asbury Park, N. J., plans power substation at Freneau, N. J., with steel tower transmission line from South Amboy generating plant. American Austin Car Company, Butler, Pa., contemplates addition for automobile body manufacture to cost over $400,000. Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until August 12 for wire and cable (Schedule 3830); for motors, generators and control apparatus (Schedule 3857), and for storage battery testing outfits (Schedule 3845).

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SOUTHWEST

—IN SPITE OF GENERALLY UNFAVORABLE *conditions and seasonal dullness in all lines of business, there has been a fairly steady movement of the smaller sizes of electrical apparatus. There are also several good-sized projects, including two hydro-electric and three large manufacturing plants being considered.*

Contracts reported closed during the past week are $45,000 for metal-clad switchgear for station auxiliaries in a large water-power plant now under construction; for overhauling a 20,000-kw. turbine in a local power plant, and equipment for "Whiteway" lighting in one of the Ozark cities totaling $5,000.

CONSTRUCTION PROJECTS

Board of Education, St. Louis, Mo., plans mechanical repair and equipment building to cost over $100,000. Hayti, Mo., plans municipal electric light and power plant to cost $70,000. Arkansas Light & Power Company, Pine Bluff, Ark., will build a light and power system at Harrison, Ark., to cost $30,000. Texas Electric Service Company, Fort Worth, Tex., plans extensions in transmission lines and substations to cost $450,000. United Chemical Company, Dallas, Tex., plans plant to cost $100,000.

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NEW ENGLAND

—CENTRAL-STATION SUPPLIES ARE ATTRACTING *interest and a number of orders for new substation equipment were recently received, among which are noted switch and control equipment for stations in eastern Maine and eastern Connecticut districts. Insulator sales are reported in good volume. Orders will be placed soon for substation needs amounting to about $15,000. Recently orders for steel towers for a river crossing in southern New England and northern Maine were placed.*

Small motor sales continue to maintain an even trend. Switch and control equipment are selling in good volume due to a number of recent boiler plant additions and replacements in this district. Transformer sales are spotty, but orders are being received for single units in good volume. Line materials are less active, but contractors are more interested in new construction supplies for wiring and interior illumination. Heavy electrical machinery sales are uneven in trend. One manufacturer reports an order for a 1,500-kw. turbo-generator and notes an increase in the number of inquiries for this type of machinery.

General scheduled materials are holding up well and a slight increase in inquiries is reported. Generally a more encouraging viewpoint is noted among manufacturers and distributors. New building projects are appearing, among which is a $30,000,000 project for Boston which includes a general and a professional office building.

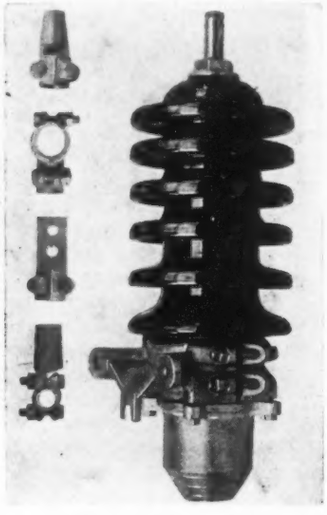
CONSTRUCTION PROJECTS

Edison Electric Illuminating Company, Boston, Mass., will make extensions in lines and build substation in Concord district to cost $700,000. Malden Electric Company, Malden, Mass., plans equipment, laboratory and distributing station to cost about $100,000. Universal Winding Company, Providence, R. I., has filed plans for an addition to textile machinery plant to cost $100,000.

New Equipment Available

Cementless Terminator for Underground Cables

A TERMINATOR HAVING ALL JOINTS held together by mechanical structure rather than by cement, with sealing gaskets between the joints to make them water, oil and vacuum-tight, is announced by



the Delta-Star Electric Company of Chicago.

The terminator is for use on underground cable and has a rating of 23 kv., 400 amp. It has a double bracket mounting, which insures easy installation and high strength, according to the manufacturer, and it is so constructed that the aerial lug may be disconnected for sectionalizing purposes.

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VAPOR-PROOF COUPLINGS AND CONNECTORS for "Steeltubes" electrical metallic tubing, which enable the consumer to make waterproof installations with any standard threaded fittings, are announced by Steel & Tubes Company, Cleveland. Improved bending devices are also announced by the company.

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FOR WIRING SYSTEMS IN HOMES where an electric range is used in addition to other electrical apparatus a combined main service meter test switch and branch distribution panel has been placed on the market by the Bull Dog Electric Products Company, Detroit. Catalog numbers 721204 and 721206 of this product combine in one cabinet a 60-amp. externally operated meter test entrance switch and a branch distribution panel consisting of a 60-amp. fuse, which permits a 40-amp. fusible circuit for range or other device and four or six 30-amp. plug fusible circuits for lights, hot water heater, etc. Compactness, convenience, ease of wiring and ornamental appearance are claimed for these new products.

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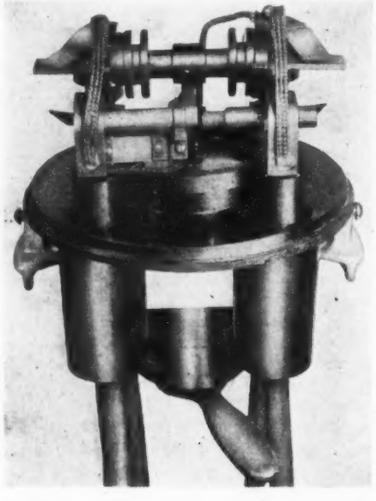
Automatic Cutout Isolates Ruptured Loops

PUBLIC DANGER CAUSED by ruptured and dangling high-tension wires of street-lighting circuits is eliminated by a cutout device recently placed on the market by the States Company, Hartford, Conn. This apparatus automatically disconnects a defective loop of a series circuit and keeps the remainder of it in operation.

The main body of the cutout is one piece of molded bakelite. An aluminum cover protects the operating parts. The operating magnet has a stationary shell and movable laminated plunger core. The contact bar rests on lower contact springs which connect through terminals and leads to that portion of the line being protected. Each of the two line terminals supports a carbon rod and between these rods is an adjustable spark gap.

When a break occurs in the circuit

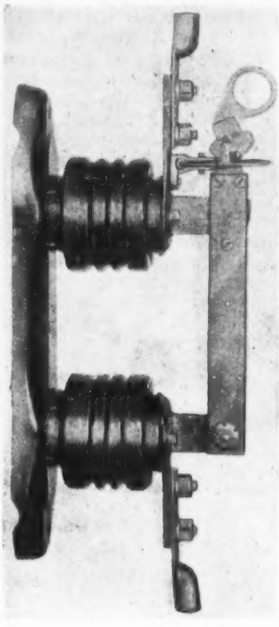


the full potential difference of the line exists across the adjustable gap and breaks down its resistance, causing a current to flow which energizes the solenoid and causes its core to draw up the contact bar and disconnect the defective circuit.

Disconnecting Switch Has Locking Latch Device

SOMETHING DIFFERENT in the way of indoor disconnecting switches is found in the type LG-118B switch announced by General Electric Company.

The blade is made from hard-drawn switch copper and consists of two lami-



nations. The opening eye of switches with blade latches is a casting having a large opening and a cam on either side. One cam releases the latch and the other operates in conjunction with the latch to provide a seal-break feature. The blade latch, consisting of two malleable iron castings hinged together and a non-corrosive spring, locks the blade closed under any electromagnetic stress tending to open it. However, when acted upon by the opening eye, the latch is released and the seal-break features are actuated to start opening.

This switch is made single-pole, single and double-throw, front connected, back connected, and combination connected. It is designed for moderate duty.

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AN IMPROVED TYPE OF SOLDERLESS TERMINAL LUG for use with air break and oil break switches has been developed by the Delta-Star Electric Company, Chicago, Ill. The lug bolts directly to the equipment contact block or stud, the line conductor being clamped in position by means of U-bolts, which tighten down, forming a solderless compression joint. These new terminal lugs are made for a wide range of conductor fittings and are quickly applied in the field.